**3GPP TSG-RAN WG4 Meeting # 95-e draftR4-2009042**

**Electronic Meeting, 25 May - 5 June, 2020**

**Agenda item:** 6.17.2.2

**Source:** Moderator (Nokia, Nokia Shanghai Bell)

**Title:** Email discussion summary for [95e][322] NR\_HST\_Demod\_BS

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion and provide some guidelines for email discussion if necessary.*

*List of candidate target of email discussion for 1st round and 2nd round*

* 1st round: TBA
* 2nd round: TBA

## Background and scope

This T-doc will be used to guide and summarize the email discussion for the topic of Rel-16 NR HST BS demodulation requirements (AI 6.17.2.2), with the email thread identifier “[95e][322] NR\_HST\_Demod\_BS”.

The scope of this email discussion are Rel-16 NR HST BS demodulation requirements, and in particular the agenda items:

6.17.2.2 BS demodulation requirements (38.104)

6.17.2.2.1 PUSCH requirements

6.17.2.2.2 PRACH requirements

6.17.2.2.3 UL timing adjustment requirements

In general, the 1st round of the email discussion mainly aims to collect the companies’ views on the open issues, while the 2nd round aims achieve consensus on remaining controversial issues.

In addition to this general split between round 1 and round 2, we aim to focus the following candidate targets:

List of candidate targets of email discussion for 1st week and 2nd week

* 1st week:
  + Collect (updated) company views on all topics.
  + Give feedback on Moderator proposed agreements.
  + Align on ITU submission related specification cleaning way forward. See sub-topic 1-6.
  + PUSCH
    - Reach agreement on DFT-s-OFDM and manufacturer declaration.
  + PRACH
    - Decide if previous agreements need to be revisited and agree on manufacturer declaration.
  + UL TA
    - Reach agreement on scenario “X”, addition CBW/SCS, and progress on manufacturer declarations.
* 2nd week:
  + Follow the guidelines from the “summary for 1st round” sections recommendations.

## Email discussion guidelines

Unless different guidance is received from the session chairs, the moderator would like to ask companies to adhere to the following guidelines, when taking part in [95e][322] NR\_HST\_Demod\_BS.

Please also check the “RAN4#95-e E-meeting Arrangements and Guidelines”, available on the reflector, for fundamental guidelines and deadlines.

The preferred method of commenting is to add/update your company’s view directly in this email summary document (use change marks if appropriate) and upload it to the [95e][322] NR\_HST\_Demod\_BS.

* Draft folder:   
   [322](ftp://3gpp.org/tsg_ran/WG4_Radio/TSGR4_95_e/Inbox/Drafts/322/)  
  ftp://3gpp.org/tsg\_ran/WG4\_Radio/TSGR4\_95\_e/Inbox/Drafts/322/
* It is expected delegates will download the latest version (including other companies’ versions) of the summary document, insert comments and upload it again.  
  To ensure the comments are captured timely and correctly, delegates are encouraged to:
  + Rename the file by adding your company name.  
    Example: “Summary\_322\_1st round Rev**1\_CATT\_Nok**.docx”
  + Send an email on the reflector informing that comments are made with new correct file name.
  + Please check for possibly updated base document versions, right before uploading your updates.
* Company views can be updated, e.g., based on comments from other companies
  + The revised comments should be easy to identify, for example, by marking them as “after seeing comments from …/ or intermediate proposal, our position/comment now is …”, while the initial comments remain unchanged in the template file.
  + Asking direct questions to other companies is possible in their views, but often overlooked in the first round/week.
* Please do not hesitate to mark your company as supporting a certain option directly in this document.  
  Please refrain from rewriting existing options and proposed WFs; ask the moderator to modify/add.
* It is encouraged to give a short reasoning for each view expressed (1-2 sentences are recommended).  
  Please avoid statements like “Option X”, without further explication or reasoning.
* Moderator is trying to provide a new “cleaned” revision of the base document once a day.   
  Example: “Summary\_322\_1st round Rev**2**.docx”
  + Comments only received by email will merged into the summary document by the moderator on a best effort basis.

# Topic #1: PUSCH requirements (6.17.2.2.1)

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

This section contains T-docs with corresponding proposals and observations submitted to the agenda item “6.17.2.2.1 PUSCH requirements”, as well as, any PUSCH requirement related observations and proposals submitted to other agenda items.

## Companies’ contributions summary

Ordering: 1st by agenda item, 2nd by Tdoc number.

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-20xxxxx | Company A | Proposal 1:  Observation 1: |
| R4-2006254 (AI 6.17.2.2) | CATT | Moderator: Simulation summary. |
| R4-2006266 | CATT | PUSCH high speed support declaration  **Proposal 1: To avoid the test redundancy and align with implicit test passing, it is proposed to declare category of supported maximum speed (Option 1).**   * + Option 1:  Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Which tests need to be passed, if 500kph is declared, is discussed separately under “High speed implicit test passing” |
| R4-2006267 | CATT | PUSCH multi-path fading channel model  Observation: Multi-path fading channel is very rare in HST scenarios (open area or tunnel) (Option 1).  **Proposal 1: Do not specify requirements for multi-path fading channel models with high Doppler values (Option 1).**   * Option 1: Do not specify requirements for multi-path fading channel models with high Doppler values. |
| R4-2006270 | CATT | Moderator: CR TS 38.141-1  PUSCH manufacturer declaration   |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h) for PUSCH and UL timing adjustment for HST. | x | x | |
| R4-2006271 | CATT | Moderator: CR TS 38.141-2  PUSCH manufacturer declaration   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | D.109 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h) for PUSCH and UL timing adjustment for HST. | c | x | n/a | |
| R4-2006769 | CMCC | Multi-path fading channel under high Doppler value  **Proposal 1: it is proposed to specify PUSCH requirements for multi-path fading channel with maximum doppler shift of 600Hz and 1200Hz for 15kHz SCS and 30kHz SCS, respectively.** |
| R4-2006052 (AI 6.17.2.2.1) | Nokia, Nokia Shanghai Bell | PUSCH implicit test passing applicability rule  **Proposal 1: RAN4 to capture the following applicability rule in test specifications: “Unless otherwise stated, a BS that declares to support 500kph (see D.XXX in table 4.6-1), and passes the tests for 500kph, can also consider the tests for 350kph as passed.”**  PUSCH high speed support declaration for HST  Observation 1: There are algorithmic differences between a BS deployed in “500kph only” scenarios and “350/500kph mixed” scenarios.  **Proposal 2: RAN4 to allow the distinction between “500kph only” scenarios and “350/500kph mixed” scenarios in manufacturer declarations.**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.10X | PUSCH high speed train supported target speeds | Declaration of the supported high speed train target speeds, i.e., not declared (no high speed train support), 350km/h, 500km/h, or 350km/h and 500km/h. | x | x |   1T1R requirements for the tunnel scenario - Applicability rule  **Proposal 3: RAN4 to allow foregoing testing for 1T1R, when 1T2R is tested. This to be captured in applicability rule by changing previous rule as follows: “In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the lowest number or two supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.”**  1T1R requirements for the tunnel scenario - Configuration  **Proposal 4: RAN4 to have requirements for both MCS2 and MCS16.**  DFT-s-OFDM waveform  Observation 2: In high speed 70%TPUT requirements, dft-s-OFDM improves coverage by less than 0.4dB in MCS2 and loses coverage (within simulation uncertainty) for MCS16.  **Proposal 5: RAN4 to not add dft-s-OFDM to minimum requirements, since coverage of re-farming LTE bands is not impacted.**  Multi-path fading channel under high Doppler value  Observation 3: The highest proposed value (2400Hz) corresponds to 650kph@2.1GHz or 375kph@3.6GHz, which does not correspond to any categories considered up until now. Neither does the proposed lower value of 1200Hz.  **Proposal 6: RAN4 to not consider multi-path fading channels under high Doppler value. The minimum test coverage is already achieved and senseful Doppler values would require extensive further studies.**  Agreeing on SNR values  **Proposal 7: Unless new simulation results are received, capture the SNR values summarized in R4-2005573 in the PUSCH CRs.**  HST test setup figures and TTS  Observation 4: RAN4 should verify, if further HST PUSCH additions to “Measurement of performance requirements” (TT definitions in TS 38.131-1/2 appendix C.3) and “Measurement system set-up” for “performance requirements” (appendix D) are required; similar to R4-2003272. |
| R4-2006053 | Nokia, Nokia Shanghai Bell | Moderator: CR TS 38.104 |
| R4-2006054 | Nokia, Nokia Shanghai Bell | Moderator: CR TS 38.104 |
| R4-2006258 | CATT | Moderator: Simulation results  PUSCH Additional SCS/CBW  **Proposal 1: add 5MHz CBW/15kHz SCS, 10MHz CBW/30kHz SCS for PUSCH to simulation results summary.** |
| R4-2006265 | CATT | 1T1R for tunnel scenario for NR HST PUSCH  **Proposal 1: The tests with low MIMO correlation level shall apply only for the lowest number or two supported connectors, in addition to the highest numbers of supported connectors. (Option 4)**   * Option 4: Define test applicability rule in the section 8.1.2.0 of TS 38.141-1 as:   + “In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the lowest number or two supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.”   **Proposal 2: If 1T1R requirement is introduced, only have MCS 2 requirements (Option 1).**   * Option 1: If 1T1R requirement is introduced, only have MCS 2 requirements. |
| R4-2006268 | CATT | DFT-s-OFDM for NR HST PUSCH  **Proposal 1: Do not introduce PUSCH HST requirements for DFT-s-OFDM (Option 2).** |
| R4-2006323 | Samsung | 1T1R requirements for the tunnel scenario  **Proposal 1: only MCS 2 requirement is preferred to introduce for 1T1R requirement.**  Test applicability rule for 1T1R requirement  **Proposal 2: Define test applicability rule in the section 8.1.2.0 of TS 38.141-1 as: “In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the lowest number or two supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.”**  Other requirements - DFT-s-OFDM  **Proposal 3: No HST PUSCH requirement with DFT-s-OFDM waveform.**  **Proposal 4: If agreed to introduce HST PUSCH requirement with DFT-s-OFDM waveform, only 500kph requirement is preferred to introduce.**  Other requirements - fading channel environment  **Proposal 5: If agreed to introduce the related requirement, the high Doppler with 600Hz and 1200Hz for 15 KHz and 30 KHz SCS can be regarded as the starting point for the feasibility study with HST requirement with high Doppler**  Initial results for fading channel  Observation 1: The fading channel with high Doppler 600Hz is feasible for MCS2 with configured 3 DMRS symbols.  Observation 2: The performance of MCS 16 under fading channel with large Doppler value suffers large degradation as Doppler increasing.  Observation 3: PUSCH with CP-OFDM waveform and DFT-s-OFDM waveform under fading channel high Doppler value have the similar results.  **Proposal 6: If agreed to introduce PUSCH requirement with multi-path fading under high Doppler value, focus on the requirements with CP-OFDM waveform.** |
| R4-2006666 | ZTE Wistron Telecom AB | Manufacturer declaration maximum supported speed for HST  **Proposal 1:** **Introduce a new declaration item (Option 1) shown in Table -1.**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | Maximum supported speed for High Speed Train | Declaration of the maximum supported speed for High Speed Train scenarios. The declaration is chosen from the set {No HST support, 350 km/h, 500 km/h} and applicable to HST PUSCH, UL TA and HST PRACH. Speed(s) less than the declaration shall also be supported under this declaration. | x | x |     DFT-s-OFDM  **Proposal 2: Focus on completion of Rel-16 performance requirements at this stage and do not introduce DFT-s-OFDM requirements for HST PUSCH (Option 2).**  Multi-path fading channel under high Doppler value  **Proposal 3: Multi-path fading in high speed train may lead to non-coherence within the same slot, therefore support of HST scenarios requires a non-multi-path fading deployment, and no requirement should be introduced for multi-path fading channel under high Doppler value (Option 1).** |
| R4-2006833 | Ericsson | High speed support declaration for HST PUSCH  **Proposal 1:** **Declare category of supported maximum speed. This can be either 350km/h or 500km/h. Only the corresponding requirements are tested.**  If 1T1R requirements is introduced: MCS configuration  **Proposal 2: Agree with Option 2 that introduce MCS2 and MCS16 requirements for 1T1R.**  DFT-s-OFDM waveform  **Proposal 3: Do not introduce DFT-s-OFDM requirements for HST scenarios.**  Multi-path fading channel under high Doppler value  **Proposal 4: Do not introduce multi-path fading channel under high Doppler shift requirements to HST scenario.** |
| R4-2006836 | Ericsson | Moderator: CR TS 38.141-2 |
| R4-2006837 | Ericsson | Moderator: CR TS 38.141-2 |
| R4-2007182 | NTT DOCOMO, INC. | Declaration and applicability  **Proposal 1: Allow to declare category of supported design target speed(s) from “no HST”, “HST for 350km/h”, “HST for 500km/h” or “HST for both 350km/h and 500km/h” and introduce the following declaration:**   | Declaration identifier | Declaration | Description | Applicability | | | | --- | --- | --- | --- | --- | --- | | *BS type 1-C* | *BS type 1-H* | *BS type 1-O* | | D.1xx | PUSCH for HST | Declaration of the supported HST scenarios: no HST, HST for 350km/h, HST for 500km/h or HST for both 350km/h and 500km/h. | x | x | x |     Requirement for 1T1R  **Proposal 2: Define test applicability rule in the section 8.1.2.0 of TS 38.141-1 as below:  “In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the lowest number or two supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.”**  **Proposal 3: Define MCS 2 and MCS16 requirements for 1T1R.**  Requirement for DFT-s-OFDM  **Proposal 4: Introduce PUSCH HST requirements for DFT-s-OFDM.**  **Proposal 5: The following configuration and applicability rule for DFT-s-OFDM are considered.  Antenna configuration: Only 1T2R  MCS: Only MCS2  CBW and SCS: Only 5MHz CBW/15kHz SCS and 10MHz CBW/ 30kHz SCS  Velocity: Only 350km/h  Applicability rule:   If BS that declare to support HST for DFT-s-OFDM, BS vendor can chose either DFT-s-OFDM or CP-OFDM for the test with 1T2R, MCS2, 5MHz CBW/15kHz SCS or 10MHz CBW/30kHz SCS and 350km/h HST scenarios. (The number of tests is kept)**  Requirement for Multi-path fading scenario  Observation 1: In NR UE HST, it was agreed to introduce PDSCH performance requirements for multi-path fading condition with 600Hz and 1200Hz Doppler frequency for 15kHz and 30kHz SCS, respectively.  Observation 2: In LTE HST, it was agreed to introduce multi-path fading channel as one of the high speed scenarios and to define ETU600 for PDSCH/PUSCH.  **Proposal 6: Multi-path fading is a typical HST scenario.**  **Proposal 7: Introduce PUSCH for multipath fading scenarios with Doppler frequency 600Hz for 15 kHz SCS and 1200Hz for 30 kHz SCS**  **Proposal 8: Introduce new PUSCH requirements for multi-path fading conditions in non-HST PUSCH section.** |
| R4-2007183 | NTT DOCOMO, INC. | Moderator: CR TS 38.141-1 |
| R4-2007184 | NTT DOCOMO, INC. | Moderator: CR TS 38.141-1 |
| R4-2007231 | Huawei, HiSilicon | Applicability rules and declarations for PUSCH  **Proposal 1: Option 1 can be applied for high speed support declaration for HST PUSCH.**   * Option 1:  Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Which tests need to be passed, if 500kph is declared, is discussed separately under “High speed implicit test passing”   Applicability rules for antenna configuration  **Proposal 2: In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for either the minimum or the sub-minimum number of supported connectors, in addition to the maximum numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.**  Performance requirements for DFT-s-OFDM  **Proposal 3: Do not introduce PUSCH HST requirements for DFT-s-OFDM.**  Performance requirements for fading channel  **Proposal 4: Do not specify requirements for multi-path fading channel models with high Doppler values.** |
| R4-2007422 | Intel Corporation | HST multi-path fading channel conditions  Observation #1: Practical channel estimation leads to small demodulation performance degradation compare to scenario with perfect channel estimation. Performance loss is limited by 1dB for at least up to MCS 17.  **Proposal #1: Specify PUSCH requirements for multi-path fading channel with maximum doppler shift of 600Hz and 1200Hz for 15kHz SCS and 30kHz SCS respectively.** |
| R4-2007423 | Intel Corporation | Moderator: Simulation results. |
| R4-2008206 | Huawei, HiSilicon | Moderator: Simulation results. |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1: 1T1R requirements

*Sub-topic description:*

In the last meeting (RAN4#94-e-Bis), it was agreed to introduce 1T1R requirements for the tunnel scenario, but the applicability rules, and some other configurations, are FFS:

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| **Configurations to be tested**   * Introduce 1T1R requirements for the tunnel scenario   Previous applicability rule wording options (Informative):   * + Option 3 : Define test applicability rule in the section 8.1.2.0 of TS 38.141-1 as:     - Unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the ~~lowest and~~ highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.   + Option 4: Define test applicability rule in the section 8.1.2.0 of TS 38.141-1 as:     - “In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the lowest number or two supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.”   Agreement 2nd round (online session)  RAN4 will introduce 1T1R for the tunnel scenario requirements only for conducted requirements, FFS for the test applicability rule   * Agreements from 1st round   + If 1T1R requirement is introduced: 1T1R requirement configuration     - Re-use the 1T2R requirement configuration.   + Slot allocation     - Only capture to use TDD pattern according to the previous WF agreement [R4-1915886]: Reuse the existing TDD configurations. 15 kHz SCS: 3D1S1U, S=10D:2G:2U 30 kHz SCS: 7D1S2U, S=6D:4G:4U * If 1T1R requirement is introduced: MCS configuration   + Option 1: If 1T1R requirement is introduced, only have MCS 2 requirements.   + Option 2: If 1T1R requirement is introduced, have MCS 2 and MCS16 requirements.   Proposed WF:  TBD after 1T1R introduction agreed.   * If 1T1R requirement is introduced with OTA testing: 1T1R requirement configuration   Agreement 2nd round:  Do not introduce OTA testing. |

This sub-topic will **exclude the discussion on 1T1R applicability rules**, which will be treated in the PUSCH applicability rules sub-topic.

*Open issues and candidate options before e-meeting:*

**Issue 1-1-1: 1T1R requirements for the tunnel scenario - MCS configuration**

* Proposals
  + Option 1 (CATT, Samsung, Huawei, ZTE): Only have MCS 2 requirements.
  + Option 2 (DoCoMo, Ericsson, Nokia): Have MCS 2 and MCS16 requirements.
  + Option 3 (Intel): Define HST Tunnel with only MCS 2 and HST multi-path fading with MCS 16.
* Recommended WF
  + Collect further company views during 1st round.

### Sub-topic 1-2: Multi-path fading channel under high Doppler

*Sub-topic description*

In RAN4#94-bis-e, the discussion on multi-path fading channel under high Doppler value was postponed until RAN4#95-e [2]:

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| * Multi-path fading channel under high Doppler value   + Option 1: Do not specify requirements for multi-path fading channel models with high Doppler values.   + Option 2: Specify PUSCH requirements for multi-path fading channel with maximum doppler shift of 1200Hz and 2400Hz for 15kHz SCS and 30kHz SCS, respectively.   + Option 3: Specify PUSCH requirements for multi-path fading channel with maximum doppler shift of 600Hz and 1200Hz for 15kHz SCS and 30kHz SCS, respectively.   Proposed WF:  FFS until next meeting.   * Is multi-path fading channel under high Doppler value a common scenario?   + Option 1: Multi-path fading channel is very rare in HST scenarios (open area or tunnel).   + Option 2: Fading channel is also typical condition in the real propagation under high speed.   Proposed WF:  FFS until next meeting. |

*Open issues and candidate options before e-meeting:*

**Issue 1-2-1: Is multi-path fading channel under high Doppler value a common scenario?**

* Proposals
  + Option 1 (DoCoMo, Intel): Multi-path fading is a typical HST scenario.
  + Option 2 (Huawei, Ericsson, Nokia, ZTE, CATT): Multi-path fading is not a typical HST scenario.
  + Option 3 (Samsung): Multi-path fading should be a specific HST scenario and relevant requirements if introduced should be optional and BS declared basis.
* Recommended WF
  + Collect further company views during 1st round.

**Issue 1-2-2: Specification of multi-path fading channel under high Doppler**

* Proposals
  + Option 1 (Huawei, Ericsson, ZTE, CATT, Nokia): Do not specify requirements for multi-path fading channel models with high Doppler values.
  + Option 2 (Intel, DoCoMo, CMCC): Specify PUSCH requirements for multi-path fading channel with maximum doppler shift of 600Hz and 1200Hz for 15kHz SCS and 30kHz SCS, respectively.
  + Option 3 (Samsung): If agreed to introduce the related requirement, the high Doppler with 600Hz and 1200Hz for 15 kHz and 30 kHz SCS can be regarded as the starting point for the feasibility study with HST requirement with high Doppler.
  + Option 4 (Intel): Define HST Tunnel with MCS 2 and HST multi-path fading with MCS 16.
* Recommended WF
  + Collect further company views during 1st round.

**Issue 1-2-3: Where to specify multi-path fading channel under high Doppler.**

* Proposals
  + Option 1 (DoCoMo, Ericsson, CATT): If specified, introduce new PUSCH requirements for multi-path fading conditions in non-HST PUSCH section.
  + Option 2 (Nokia, Samsung?, ZTE): Postpone after 1-2-2.
* Recommended WF
  + Deprioritize discussion until inclusion of multi-path fading channel decided (see issue 1-2-2).

**Issue 1-2-4: Waveform, if multi-path fading channel under high Doppler is specified.**

* Proposals
  + Option 1 (Samsung): Focus on the requirements with CP-OFDM waveform.
  + Option 2 (CATT): Postpone after 1-2-2.
* Recommended WF
  + Deprioritize discussion until inclusion of multi-path fading channel decided (see issue 1-2-2).

### Sub-topic 1-3: DFT-s-OFDM waveform

*Sub-topic description*

In RAN4#94-bis-e, it was not agreed whether to introduce DFT-s-OFDM or not:

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| * Dft-s-OFDM waveform   + Option 1: Introduce PUSCH HST requirements for DFT-s-OFDM.   + Option 2: Do not introduce PUSCH HST requirements for DFT-s-OFDM   + Option 3: Define DFT-s-OFDM only for 350km/h scenario, 1T2R and minimum channel bandwidth   Proposed WF:  Discuss in next meeting. Clarify how/if implicit test passing is still applicable. |

*Open issues and candidate options before e-meeting:*

**Issue 1-3-1: Include requirements for DFT-s-OFDM waveform**

* Proposals
  + Option 1 (DoCoMo): Introduce PUSCH HST requirements for DFT-s-OFDM.
  + Option 1b (DoCoMo): Introduce PUSCH HST requirements for DFT-s-OFDM, with limited parameter as proposed in issue 1-3-3 and applicability rule to test either DFT-s-OFDM or CP-OFDM for MCS2.
  + Option 2 (Huawei, Ericsson, ZTE, Samsung, CATT, Nokia): Do not introduce PUSCH HST requirements for DFT-s-OFDM.
* Recommended WF
  + Collect further company views during 1st round.  
    Explore if compromise to option 2 is possible.

**Issue 1-3-2: If DFT-s-OFDM waveform is introduced, target speed.**

* Proposals
  + Option 1 (Samsung): Only 500kph requirement.
  + Option 2 (CATT): Postpone after 1-3-1.
* Recommended WF
  + Come back to this issue, once DFT-s-OFDM inclusion is decided (issue 1-3-1).

**Issue 1-3-3: If DFT-s-OFDM waveform is introduced, configuration.**

* Proposals
  + Option 1 (DoCoMo): The following configuration and applicability rule for DFT-s-OFDM:
    - Antenna configuration: Only 1T2R
    - MCS: Only MCS2
    - CBW and SCS: Only 5MHz CBW/15kHz SCS and 10MHz CBW/ 30kHz SCS
    - Velocity: Only 350km/h
    - Applicability rule:
      * If BS that declare to support HST for DFT-s-OFDM, BS vendor can choose either DFT-s-OFDM or CP-OFDM for the test with 1T2R, MCS2, 5MHz CBW/15kHz SCS or 10MHz CBW/30kHz SCS and 350km/h HST scenarios. (The number of tests is kept).
  + Option 2 (CATT): Postpone after 1-3-1.
* Recommended WF
  + Come back to this issue, once DFT-s-OFDM inclusion is decided (issue 1-3-1).

### Sub-topic 1-4: PUSCH applicability rules

*Sub-topic description*

In RAN4#94-bis-e, it was agreed to allow implicit test passing for PUSCH:

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| * High speed implicit test passing   Agreement 2nd round (online session):  Allow implicit test passing. A BS that declares to support 500kph, and passes the tests for 500kph, can also consider the tests for 350kph as passed. |

This agreement now requires a corresponding applicability rule.

*Open issues and candidate options before e-meeting:*

**Issue 1-4-1: PUSCH implicit test passing applicability rule**

* Proposals
  + Option 1 (Nokia, ZTE, Samsung, Huawei, CATT): Capture the following applicability rule in test specifications:
    - “Unless otherwise stated, a BS that declares to support 500km\h (see D.1XX in table 4.6-1) and passes the tests for 500km\h, can also consider the tests for 350kph as passed.”
* Recommended WF
  + Collect further company views during 1st round.

**Issue 1-4-2: PUSCH 1T1R applicability rule**

* Proposals
  + Option 1 (DoCoMo, Samsung, CATT, Nokia, ZTE): Allow foregoing testing for 1T1R, when 1T2R is tested. This to be captured in applicability rule by changing previous rule (in the section 8.1.2.0 of TS 38.141-1) as follows:
    - “In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the lowest number or two supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.”
  + Option 2a (, DoCoMo):
    - In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for one of the lowest two number of supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.
  + Option 2b (Huawei):
    - In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), if one connector is supported, the tests with low MIMO correlation level shall apply only for either one connector or the second lowest number of supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration
  + Option 3 (Nokia, Ericsson, Samsung, CATT, DoCoMo [first choice]):
    - In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for either the lowest number of supported connectors or two connectors, in addition to the highest number of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.
  + Option 4 (Ericsson):
    - In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the lowest number of supported connectors in addition to the highest number of supported connectors, and the specific connectors used for testing are based on manufacturer declaration. If the BS supports 1RX, the optionally 2 connectors may be tested (in addition to the highest number of connectors) in place of testing 1 connector.
* Recommended WF
  + Companies are encouraged to state during the first round, which options are acceptable to them, or propose new exact wording options, or both.
  + Following a longer discussion in Huawei’s company view on issue 1-4-2, the following wording is additionally proposed for consideration in the second round as option 5:
    - In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), if one connector is supported, the tests with low MIMO correlation level shall apply only for either one connector or the second lowest number of supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration. If one connector is not supported, the tests with low MIMO correlation level shall apply only for the lowest and highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.

### Sub-topic 1-5: Manufacturer declaration

*Sub-topic description*

In RAN4#94-bis-e, it was not agreed what categories companies can declare to support, how such categories would impact the test applicability and what choices each category should offer:

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| * High speed support declaration for HST PUSCH   + Option 1:  Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Which tests need to be passed, if 500kph is declared, is discussed separately under “High speed implicit test passing”   + Option 2: Declare category of supported design target speed(s). This can be 350 or 500 or 350&500kph (or no HST support).  Only the corresponding requirements are tested (only 350&500kph tests both).   Proposed WF  Companies are encouraged to bring specific manufacturer declaration proposals in a form that could be included in the manufacturer declaration table, i.e., all declaration groups, all choices per group, and explanation of each choice. |

*Open issues and candidate options before e-meeting:*

**Issue 1-5-1: PUSCH high speed support declaration for HST**

* Proposals
  + Option 1a (CATT, Ericsson, Nokia, ZTE, Samsung, DoCoMo): Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Shared for PUSCH/UL TA.

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| D.108 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h) for PUSCH and UL timing adjustment for HST. | x | x |

* + Option 1b (ZTE): Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Shared for PUSCH/PRACH/UL TA.

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| --- | --- | --- | --- | --- |
| D.108 | Maximum supported speed for High Speed Train | Declaration of the maximum supported speed for High Speed Train scenarios. The declaration is chosen from the set {No HST support, 350 km/h, 500 km/h} and applicable to HST PUSCH, UL TA and HST PRACH. Speed(s) less than the declaration shall also be supported under this declaration. | x | x |

* + Option 1c (Ericsson, CMCC, ZTE, Samsung): Declare category of supported maximum speed. This can be either 350km/h or 500km/h. Only the corresponding requirements are tested.
  + Option 1d (CATT): Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Shared for PUSCH/UL TA.

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| D.108 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h, or no HST support) for PUSCH and UL timing adjustment for HST. | x | x |

* + Option 1e (Huawei): Declare category of supported maximum speed. This can be either 350km/h or 500km/h. Only the corresponding requirements are tested.

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| --- | --- | --- | --- | --- |
| D.108 | High speed train | Declaration of high speed train scenario support. | x | x |
| D.109 | Maximum speed of high speed train for PUSCH | Declaration of supported maximum speed for high speed train scenario, i.e. 350 km/h or 500 km/h.  This declaration is applicable to PUSCH for high speed train and UL timing adjustment only if UE declares to support high speed train in D.108. | x | x |
| D.110 | PRACH format for high speed train | Declaration of supported PRACH format(s) for high speed train scenario, i.e. format 0 restricted set type A, format 0 restricted set type B, format A2, format B4, format C2.  This declaration is applicable to HST PRACH only if UE declares to support high speed train in D.108. | x | x |

* + Option 2a (Nokia): Allow the distinction between “500kph only” scenarios and “350/500kph mixed” scenarios in manufacturer declarations:

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| --- | --- | --- | --- | --- |
| D.10X | PUSCH high speed train supported target speeds | Declaration of the supported high speed train target speeds, i.e., not declared (no high speed train support), 350km/h, 500km/h, or 350km/h and 500km/h. | x | x |

* + Option 2b (DoCoMo): Declare category of supported design target speed(s) from “no HST”, “HST for 350km/h”, “HST for 500km/h” or “HST for both 350km/h and 500km/h” and introduce the following declaration:

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| --- | --- | --- | --- | --- | --- |
| D.1xx | PUSCH for HST | Declaration of the supported HST scenarios: no HST, HST for 350km/h, HST for 500km/h or HST for both 350km/h and 500km/h. | x | x | x |

* Recommended WF
  + Collect further company views during 1st round.
  + Companies are encouraged to give feedback on
    - Which of the two main options (350/500 vs. 350/500/350&500) they see the most advantageous solution and why?
    - Which declaration wording option they see as best or propose new exact wording options.

### Sub-topic 1-6: Specification writing

*Sub-topic description*

With the PUSCH requirement organization and simulation contributions having become quite stable, RAN4 can go ahead and finalize the specifications.  
However, it remains to verify the additional need for additions for HST in the measurement set-up and test tolerance definition.

Additionally, the cleaning of the specification TS 38.**104** ahead of ITU submission, will have an impact on the HST PUSCH CR treatment in this meeting, as indicated in the following guidance provided by the RAN4 Chair (Steven) and Demod co-chair (Haijie) to the moderators of the relevant email discussions:

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| **From:** Haijie Qiu <haijie.qiu@samsung.com>  **Sent:** Monday, May 18, 2020 4:21 AM **To:** 'Steven Chen' <steven.chen@futurewei.com>; Mueller, Axel (Nokia - FR/Paris-Saclay) <axel.mueller@nokia-bell-labs.com>; 'Johan Sköld' <johan.skold@ericsson.com> **Cc:** zhangxiaoran@CHINAMOBILE.COM; andrey.chervyakov@intel.com; Angelow, Iwajlo (Nokia - US/Naperville) <iwajlo.angelow@nokia.com>; Kai-Erik.Sunell@etsi.org; 'Nicholas Pu' <nicholas.pu@ericsson.com>; 'Thomas Chapman' <thomas.chapman@ericsson.com>; 'Yang Shan' <yangshan@chinatelecom.cn>; 'Yuan Gao' <gaoyuan@catt.cn>; 'Kazuyoshi Uesaka' <kazuyoshi.uesaka@ericsson.com>; chuhsian@QTI.QUALCOMM.COM; 'Belov, Dmitry' <dmitry.belov@INTEL.COM>; 'Chervyakov, Andrey' <andrey.chervyakov@intel.com> **Subject:** RE: ITU submission - Demod part in core specifications (36.101/36.104/38.104)  Hello All  (I change the email title to be precise)  Many thanks for the discussion. As Steven pointed out, even ITU submission target for core requirements, it is still desirable we aim to clean the entire specification including performance part in TS 36.101/36.104 and 38.104.  Based on my initial review on t-doc submission, it’s hard to give a generic rules as some CRS aims to remove [ ] on requirements; some CRs modify requirements (still keep  [ ] ); some CRs add requirements with [ ] to replace TBD; also as Axel mentioned below there are different situations for different WIs.  Considering current stage, I would like to suggest “Technical endorse if CRs agreeable as requirements still TBD  in CRs and corresponding test CRs  if any”. To be more specific for each impacted topics areas/WIs (which already indicated in the file shared by Steven for email discussion assignment):   * [95e][313] LTE\_eMTC5\_Demod: Suggest to technical endorse if CRs agreeable as requirements still TBD in CRs * [95e][315] LTE\_terr\_bcast\_Demod: Suggest to technical endorse if CRs agreeable as requirements still TBD in CRs * [95e][322] NR\_HST\_Demod\_BS: Suggest to technical endorse if CRs agreeable as requirements still TBD in CRs  for 38.104 including R4-2006053,R4-2007204 and corresponding 38.141-1,38.141-2 CR if any * [95e][324] NR\_perf\_enh\_Demod\_BS: Suggest to technical endorse if CRs agreeable as requirements still TBD or with [ ] in CR  for 38.104 of  R4-2006251 and corresponding 38.141-1,38.141-2 CR if any * For 38.104 clean-up CR: R4-2008100/2008099: suggest to treat the changes of performance part in email thread “  [95e][312] Demod\_Maintenance” to check by demod experts  and avoid the duplicated changes with other demod CRs   Hope above suggestion fine to everyone.  BR, Haijie |

*Open issues and candidate options before e-meeting:*

**Issue 1-6-1: Removal of TBD and []**

* Proposals
  + Option 1 (Nokia): Agreeing on SNR values.  
    Unless new simulation results are received, capture the SNR values summarized in R4-2005573 in the PUSCH CRs
  + Option 2: (RAN4 chair and demod session chair):   
     Submitted TS 38.104 CRs could be technically endorsed.  
     Submitted TS 38.141-1/2 CRs could be agreed.  
     Try to resolve TBDs and [].
  + Option 3 (Huawei)  
    Firstly check if some companies have plan to submit new results or update their results in next meeting, if no, just agree CRs endorsed in last meeting and add SNR the requirements based on the latest results summary. All other newly submitted CRs for this meeting can only be endorsed if agreeable.
  + Option 4 (DoCoMo): TBDs can be updated, if enough simulation results are provided.
* Recommended WF
  + Do not agree TS 38.104 CRs that introduce new TBDs or [], either postpone, or technically endorse, or change to no longer add new TBDs or [].
    - Discuss, if [] can be removed and TBDs can be replaced in the draftCRs endorsed last meeting.
    - Change all remaining [TBD] to TBD.
    - Consider removing requirements with remaining TBD.
  + For PUSCH in particular: Do not introduce minimum CBW requirements in CRs this meeting.

**Issue 1-6-2: HST test setup figures and test tolerances**

* Proposals
  + Option 1 (Nokia): Verify if further HST PUSCH additions to “Measurement of performance requirements” (TT definitions in TS 38.131-1/2 appendix C.3) and “Measurement system set-up” for “performance requirements” (appendix D) are required; similar to R4-2003272.
* Recommended WF
  + Test specification CR authors to verify the need for new measurement setup figures and TTs.
    - Remark: LTE has re-used the measurement setup figure for PUSCH in PUSCH HST (TS 36.141 I.3.2) by adding “HST” to heading and caption, as well as adding a note.  
      LTE also added new PUSCH HST TTs (36.141 G.3).
  + Other delegates to check, if the additions in the CR are technically correct and sufficient.

### Sub-topic 1-7: Simulation summary management

*Sub-topic description*

Following recent agreements, for example on additional SCS/CBW combination, the simulation summary collection needs to be updated

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| Agreement 2nd round:  Keep previous agreement.  Add requirements for 5MHz CBW/15kHz SCS, 10Mhz CBW/30kHz SCS for CP-OFDM with applicability rule as for Rel-15 (i.e., only largest CBW per SCS needs to be tested). |

*Open issues and candidate options before e-meeting:*

**Issue 1-7-1: Additional SCS/CBW combinations in the simulation summary**

* Proposals
  + Option 1 (CATT, Nokia, ZTE, Huawei. CATT): Add 5MHz CBW/15kHz SCS, 10MHz CBW/30kHz SCS for PUSCH to simulation results summary.
* Recommended WF
  + Add 5MHz CBW/15kHz SCS, 10MHz CBW/30kHz SCS for PUSCH to simulation results summary.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Issue 1-1-1:  Issue 1-1-2:  ….  Others: |
| Ericsson | **Issue 1-1-1: 1T1R requirements for the tunnel scenario - MCS configuration**  Agree with Option 2. Based on simulation results, we see MCS16 is feasible fo1 1T1R. And we don’t think multi-path fading channel with high Doppler shift is a suitable assumption for HST, especially for tunnel scenario. In that case, we prefer have both MCS2 and MCS16 as other requirements.  **Issue 1-2-1: Is multi-path fading channel under high Doppler value a common scenario?**  We still don’t think it is a typical scenario for HST. In LTE TR36.878, ETU600 was taken as an assumption for high speed train, but it just considered a possible maximum speed (300~350km/h) and didn’t consider the BS PUSCH HST deployment. Since the HST BS are normally deployed close to the railway, there is rare buildings and obstacles between BS and UE when train is at a very high speed. Furthermore, multi-path fading requirement is separate from HST requirements even in LTE spec. We think it implicitly shows that multi-path channel under high Doppler is not considered as a typical HST scenario in LTE discussion. Furthermore, this scenario is not even a normal NR scenario because vehicles can’t reach so high speed in dense urban. In summary, we think it is not expected in real life that multi-path fading is combined with high Doppler.  But we also see this requirement has been introduced on UE side, so we want companies to decide should we also introduce it on BS side even we can’t figure out a realistic scenario for it.  **Issue 1-2-2: Specification of multi-path fading channel under high Doppler**  Agree with Option 1.  **Issue 1-2-3: Where to specify multi-path fading channel under high Doppler**  If it is in a non-HST section, then it should be considered as a normal NR requirement not HST since we have agreed to introduce a separate section for HST PUSCH.  But as we are mentioned in Issue 1-2-1, this scenario is not even a realistic normal NR scenario since there is no such fast vehicle in dense urban.  **Issue 1-3-1: Include requirements for DFT-s-OFDM waveform**  Agree with Option 2. There is very small performance difference between DFT-s-OFDM and CP-OFDM when discuss Rel-15 requirements. And some companies also deliver their comparing simulation results for HST. The difference is still very small. So we don’t think we need more requirements.  **Issue 1-4-2: PUSCH 1T1R applicability rule**  We have a question on this issue if we go for these two options. If a BS supports 2/4/8 Rx, then it can be allowed to test 4 and 8 Rx? Is it really aligned with our previous agreement?  Nokia: All three option would require the testing of 2 and 8 Rx in this example.  Ericsson: We can agree with Option 3 because it is more precise  Ericsson: Looking back all discussion of 1T1R introduction, companies get agreement that 1T1R is a kind of optional test depend on vender’s preference. Now the discussion seems going to diversities because the wording meaning in current options are more or less contradict to the previous agreement, and we should go back to the original alignment.  We propose option 4 which almost keep the original applicability rule and add extra statement about how to handle 1T1R. We think it is aligned the agreed intention.   * Option 4   + In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the lowest number of supported connectors in addition to the highest number of supported connectors, and the specific connectors used for testing are based on manufacturer declaration. If the BS supports 1RX, the optionally 2 connectors may be tested (in addition to the highest number of connectors) in place of testing 1 connector.   **Issue 1-5-1: PUSCH high speed support declaration for HST**  Agree with 1a. No need to declare support 350&500km/h since implicit test passing is agreed for HST PUSCH and there should be no much algorithm difference between 2 target speed.  **Issue 1-6-2: HST test setup figures and test tolerances**  We need some further check, but for now, we just think new TT is not needed. |
| CMCC | Issue 1-2-1: One consideration is that different operators may have different deployment, it cannot preclude that multi-path fading channel will be used in high speed scenario by some operators. The other consideration is that in LTE, ETU600 is introduced in high speed scenario. In rel-15, the supported maximum doppler shift is only 400Hz, it is not expected that NR has worse performance than that in LTE. Taking above into considerations, it is preferred to introduce multi-path fading channel under high doppler value (i.e. 600Hz for 15KHz SCS and 1300Hz for 30KHz).  Moderator: Thank you for explaining your thinking. I cannot decipher if CMCC sees multi-path fading channel under high Doppler value a common scenario, though.  Could you please add your company name to your preferred option (or don’t if you prefer that)?  Issue 1-2-2: support option 2. Same comments as in Issue 1-2-1.  Issue 1-5-1: for the two main options (350/500 vs. 350/500/350&500), we prefer 350/500, which is aligned with the agreements in the last meeting, which is “A BS that declares to support 500kph, and passes the tests for 500kph, can also consider the tests for 350kph as passed”.  Issue 1-7-1: we are OK with the recommended WF. |
|  |  |
| ZTE | Issue 1-1-1 MCS for 1T1R requirements  For 1T1R, a high data rate should not be expected under 1T1R deployment. It seems to us that the coding rate of MCS 16 is a bit high for such deployment and UE battery may not last long, thus we think a low MCS is a proper choice (Option 1, MCS2)  Issue 1-2-1 Multipath fading channel under high Doppler value  In our understanding, multipath fading under high Doppler value may lead to non-coherence even within a slot, which may lower the achievable performance under HST. So a practical HST deployment should avoid such scenarios.  Issue 1-2-2 Specification of multi-path fading channel under high Doppler  As stated above, it is not necessary to introduce such requirements (Option 1)  Issue 1-2-3 Where to specify multipath fading channel under high Doppler  As stated abvoe, there should be no such requirements.  Issue 1-2-4 Waveform, if multi-path fading channel under high Doppler is specified  As stated above, there should be no such requirements introduced.  Issue 1-3-1 Include requirements for DFT-s-OFDM waveform  Completion of the current works defined should have higher priority. For the time being, we don’t see the urgency to include requirements for DFT-s-OFDM waveform (Option 2)  Issue 1-3-2 Target speed for DFT-s-OFDM if introduced  As stated above, there should be no such requirements introduced for the time being.  Issue 1-3-3 Configuration for DFT-sOFDM if introduced  As stated above, there should be no such requirements introduced for the time being.  Issue 1-4-1 PUSCH implicit test passing applicability rule  As a generic rule, it is reasonable to have the implicit test passing rule proposed in Option 1.  Issue 1-4-2 PUSCH 1T1R applicability rule  Option 1 is a good balance between test coverage and test efforts.  Issue 1-5-1 PUSCH high speed support declaration for HST  In our proposal, the proposed supported maximum speed for HST include HST PUSCH, HST PRACH and UL TA, though there are different preamble formats for 350km/h and 500km/h. But if companies have different opinion on HST PRACH, it is ok for us to compromise to HST PUSCH and UL TA only, leaving HST PRACH a different testing rule. So Option 1a/1b/1c is fine with us. For Option 2a and 2b, it is out of imaginary that there is a BS supporting 500km/h does not support 350km/h.  Issue 1-6-1 Removal of TBD and []  Not sure why we were outside the limited loop on this topic. The recommended WF by Moderator is fine with us.  Issue 1-6-2 HST test setup figures and test tolerance  The recommended WF by Moderator looks reasonable.  Issue 1-7-1 Additional SCS/CBW combinations in the simulation summary  Fine with Option 1, but if we have not had enough inputs to derive the requirements in this meeting, then it may not be included in the specs to avoid new TBDs. |
| Nokia, Nokia Shanghai Bell | **Issue 1-1-1: 1T1R requirements for the tunnel scenario - MCS configuration**  Considering that the 1T1R constraint comes from the leaky cable antennas in the tunnel scenario, we expect the observed SNR values to be quite high. Hence high MCS are commonly observed, and we should include requirements for MCS16.  **Issue 1-2-1: Is multi-path fading channel under high Doppler value a common scenario?**  We don’t see multi-path fading as a typical HST scenario. A train can only go at high speeds, if it is either far away from obstacles/people (i.e., open space) or if it is in a tunnel. Both environments are not multi-path environments. As soon as the train enters urban areas, it needs to slow down to normal vehicular speeds, i.e., no high Doppler shift is expected in combination with multi-path fading.  **Issue 1-2-2: Specification of multi-path fading channel under high Doppler**  As we don’t see multi-path fading as a common scenario, we don’t think it necessary to specify such requirements.  **Issue 1-2-3: Where to specify multi-path fading channel under high Doppler.**  Postpone until after decision on 1-2-2.  **Issue 1-2-4: Waveform, if multi-path fading channel under high Doppler is specified.**  Postpone until after decision on 1-2-2. But we are sympathetic to option1.  **Issue 1-3-1: Include requirements for DFT-s-OFDM waveform**  Nokia has presented simulation results that for high speed 70%TPUT requirements, dft-s-OFDM improves coverage by less than 0.4dB in MCS2 and loses coverage (within simulation uncertainty) for MCS16. Hence we prefer to not add dft-s-OFDM to minimum requirements, since coverage of re-farming LTE bands is not impacted.  **Issue 1-3-2: If DFT-s-OFDM waveform is introduced, target speed.**  Postpone until after decision on 1-3-1.  **Issue 1-3-3: If DFT-s-OFDM waveform is introduced, configuration.**  Postpone until after decision on 1-3-1.  **Issue 1-4-1: PUSCH implicit test passing applicability rule**  Option 1 is our best attempt at translating last meetings agreement into an applicability rule text proposal. We are open to changing the text.  **Issue 1-4-2: PUSCH 1T1R applicability rule**  All three options convey the same meaning. We prefer the text in option 3, followed by option 1.  **Issue 1-5-1: PUSCH high speed support declaration for HST**  In Nokia’s opinion the declaration of supported speeds should consider the product deployment scenario first and foremost. Products are created and deployed with a certain scenario in mind, i.e., 350kph trains, 500kph train, or both mixed. A 500kph declare cell will still support 350kph, but not as well as a 350&500kph BS, as the configuration and algorithms used in a 500kph and 350&500kph deployed cell will differ (see our contribution R4-2006052 for details and examples (configuration and filtering). However, at this point we are open to compromise to 350 and 500 only, and in particular option 1a (preferably with a “i.e. 350km/h, 500km/h**, or neither**” extension).  **Issue 1-6-1: Removal of TBD and []**  Each CR should be considered separately in the corresponding section of this document. But the recommended WF seems like a good starting point for this evaluation.  **Issue 1-6-2: HST test setup figures and test tolerances**  N/A to Nokia’s CRs.  **Issue 1-7-1: Additional SCS/CBW combinations in the simulation summary**  Option 1 is fine for Nokia. |
| Samsung | **Issue 1-1-1: 1T1R requirements for the tunnel scenario - MCS configuration**  We prefer option 1, only introduce MCS 2. Meanwhile we are open to further evaluate and analyse whether MCS 16 SNR requirements is achievable under 1T1R. **Issue 1-2-1: Is multi-path fading channel under high Doppler value a common scenario?**  Similar as LTE, we believe it should be a specific HST scenario and relevant requirements if introduced should be optional and BS declared basis.  Moderator: Thank you for explaining your thinking. I cannot decipher if Samsung sees multi-path fading channel under high Doppler value a common scenario, though.  Could you please add your company name to your preferred option (or don’t if you prefer that)? For now I copy pasted the text above as option 3.  **Issue 1-2-2: Specification of multi-path fading channel under high Doppler**  **I**n current stage, we are open to discuss. Our suggestion is we first agree some tentative values for further evaluations i.e. Doppler value, waveform assumption. We can defer the discussion on introducing requirements and how to organize the specification if introduced later.  **Issue 1-2-3: Where to specify multi-path fading channel under high Doppler**  Not sure what’s the difference with issue 1-2-2. Probably we should focus on issue 1-2-2.  **Issue 1-3-1: Include requirements for DFT-s-OFDM waveform**  Taking Rel-15 NR requirements experience, no much performance difference foreseen, Considering work load and test effort, prefer not to introduce test case for DFT-s-OFDM.  Suggest to defer the discussion on issue 1-3-1 and 1-3-2 pending on the progress on issue 1-3-1.  **Issue 1-4-1: PUSCH implicit test passing applicability rule**  Fine with the proposal (option1)  **Issue 1-4-2: PUSCH 1T1R applicability rule**  Support the recommended WF.  **Issue 1-5-1: PUSCH high speed support declaration for HST**  Support option 1a/1c, we didn’t see the logic if BS declared support 500km/h why such BS cannot support 300km/h. Performance optimization around certain point is BS implementation issues which out of RAN4 scope, RAN4 define minimum performance requirements which assumed no specific optimization. Meanwhile from test aspect, we also didn’t see the necessity to require BS pass both 350km/h and 500km/h test cases, as 500km/h related test cases should be choosed.  **Issue 1-6-1: Removal of TBD and []**  Fine with the recommendation, but we should align with test CRs and core spec CRs for both changes and decision to avoid misalignment and unnecessary confusion. The normal procedure would be, we first introduce performance requirements into core specification first, then we can introduce corresponding test cases into test specification. |
| Huawei, HiSilicon | **Issue 1-1-1: MCS for 1T1R requirements**  We prefer Option 1. Only MCS 2 is enough.  **Issue 1-2-1: Is multi-path fading channel under high Doppler value a common scenario**  We prefer Option 2. We don’t think that it is a common scenario in real field that have both multi-path spread and high Doppler shift.  **Issue 1-2-2: Specification of multi-path fading channel under high Doppler**  Still prefer Option 1 considering the concern on Issue 1-2-1.  **Issue 1-3-1: Include requirements for DFT-s-OFDM waveform**  Still prefer Option 2 that not introduce PUSCH HST requirements for DFT-s-OFDM  **Issue 1-4-1: PUSCH implicit test passing applicability rule**  Generally the wording is fine for us. But need to adopt the format of velocity 500km/h to keep alignment with the CR R4-2006053.  **Issue 1-4-2: PUSCH 1T1R applicability rule**  As per the previous agreement, e.g. if BS supports both 1T1R, 1T2R, 1T8R, performance requirements for either (1T1R or 1T8R) or (1T2R and 1T8R) can be tested, how to describe this applicability rule by using plain language to make the specification clearer to reader. We think that Option 2 is clearer.  We really cannot understand “either the lowest number of supported connectors or two connectors, in addition to the highest number of supported connectors”, how to understand “or two”?  Moderator: The way the proposed WF text would work is best explained at examples:  BS declares to support 1,2,8 => BS needs to test 8, and can chose to test either 1 or 2.  BS declares to support 4,8 => BS needs to test 8 and either 4 or 2.  BS declares to support 1,4 => BS needs to test 4 and either 1 or 2. It remains to be said that this is not about “the lowest two numbers”, it is really about the fixed 2RX case. A BS that declares to support (surreal numbers) 54, 53, 52, and 51 antenna connectors, would still only need to test 54 and either 51 or 2.  To moderator: Our understanding for the test applicability rule for support different number of antenna is as following:  BS declares to support 1,2,8 => BS needs to test 8, and can choose to test either 1 or 2.  BS declares to support 4,8 => BS needs to test 4 and 8.  BS declares to support 1,4 => BS needs to test 4 or both 1 and 4.  BS declares to support 1,4,8 => BS needs to test 8 and (either 1 or 4).  BS declares to support 51,52,53,54 => BS needs to test 51 and 54.  BS declares to support 1,2 => BS needs to test 2 or both 1 and 2.  If BS does not support 2Rx, it is confusing to say that BS can choose either X or 2 for test.  We would like to change our proposal as following to make it more clear:  In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), if one connector is supported, the tests with low MIMO correlation level shall apply only for either one connector or the second lowest number of supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.  Moderator: Thank you for explaining this further, now we can follow the intention of Huawei’s proposals. The newly proposed text also clearly describes the intended behaviour. The moderator will use it as a candidate option for the second round (in addition to a version that covers the case of “if one connector is not supported”. All other companies are invited to check this proposal and, at least, Nokia is in favour of the extend version.  **Issue 1-5-1: PUSCH high speed support declaration for HST**  “Which of the two main options (350/500 vs. 350/500/350&500) they see the most advantageous solution and why?”  In last meeting RAN4#94-e-Bis, RAN4 has agreed the implicit testing for 350km/h and 500km/h “A BS that declares to support 500kph, and passes the tests for 500kph, can also consider the tests for 350kph as passed.”, we really do not think that BS needs to declare 350&500 and test both, it is very easy to bring confusion to specification reader who did not join in this discussion. If some company wants to commit performances for both 350 and 500, it can be conducted in the real testing, no needs to set such constraints for all BS vendors from the specification point of view.  The declaration is designed for HST, but from all the available options for specific declaration wording except 1a, there is one declaration description option item “No HST” or “No HST support”, it is contradictory to the declaration title. Maybe one additional declaration for support HST or not can be added:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | High speed train | Declaration of high speed train scenario support. | x | x | | D.109 | Maximum speed of high speed train for PUSCH | Declaration of supported maximum speed for high speed train scenario, i.e. 350 km/h or 500 km/h.  This declaration is applicable to PUSCH for high speed train and UL timing adjustment only if UE declares to support high speed train in D.108. | x | x | | D.110 | PRACH format for high speed train | Declaration of supported PRACH format(s) for high speed train scenario, i.e. format 0 restricted set type A, format 0 restricted set type B, format A2, format B4, format C2.  This declaration is applicable to HST PRACH only if UE declares to support high speed train in D.108. | x | x |   **Issue 1-6-1: Removal of TBD and []**  Firstly check if some companies have plan to submit new results or update their results in next meeting, if no, just agree CRs endorsed in last meeting and add SNR the requirements based on the latest results summary. All other newly submitted CRs for this meeting can only be endorsed if agreeable.  **Issue 1-6-2: HST test setup figures and test tolerances**  As per the CR work assignment, the respective CR editors are responsible for the corresponding parts of HST test setup figures and test tolerances, or one company will take all of the work?  Moderator: It was my intention for the respective spec section responsible to take over this task.  **Issue 1-7-1: Additional SCS/CBW combinations in the simulation summary**  Option 1 is ok for us. |
| CATT | **Issue 1-1-1: 1T1R requirements for the tunnel scenario - MCS configuration**  Prefer option 1 to only have MCS 2. In LTE HST, only MCS 2 requirements are specified for 1T1R. For NR HST, the same principle as LTE HST can be reused to only specify MCS 2 for 1T1R. From the perspective of test case reduction, only specify MCS 2 requirements for 1T1R.  **Issue 1-2-1: Is multi-path fading channel under high Doppler value a common scenario?**  Prefer option 2. In general, the tunnel is relatively narrow compared to other scenarios. The reflected signals from different paths are considered with low time delay and thus have a negligible effect on the performance. So the multi-path fading channel seems to be rare in both the open space and the tunnel scenario.  **Issue 1-2-2: Specification of multi-path fading channel under high Doppler**  Prefer option 1.  **Issue 1-2-3: Where to specify multi-path fading channel under high Doppler.**  Postpone after the decision on Issue 1-2-2  **Issue 1-2-4: Waveform, if multi-path fading channel under high Doppler is specified.**  Postpone after the decision on Issue 1-2-2  **Issue 1-3-1: Include requirements for DFT-s-OFDM waveform**  Based on the simulation results, the performance difference between DFT-s-OFDM and CP-OFDM is rather small. Considering the performance requirement of DFT-s-OFDM is defined in Rel-15 normal demodulation, it is sufficient to only specify HST PUSCH requirement for CP-OFDM. We don’t see the demand to introduce the performance requirement for DFT-s-OFDM for NR HST.  **Issue 1-3-2: If DFT-s-OFDM waveform is introduced, target speed.**  Postpone after the decision on Issue 1-3-1.  **Issue 1-3-3: If DFT-s-OFDM waveform is introduced, configuration.**  Postpone after the decision on Issue 1-3-1.  **Issue 1-4-1: PUSCH implicit test passing applicability rule**  We are fine with option 1.  **Issue 1-4-2: PUSCH 1T1R applicability rule**  Prefer option 3. The option 3 seems to be more accurate and readable.  **Issue 1-5-1: PUSCH high speed support declaration for HST**  In RAN4#94-e-bis meeting, it is agreed to allow implicit test passing for PUSCH. So there is no need to declare 350&500 case and directly declare the supported maximum speed (350 or 500). We are fine to add the “no HST support” case in the declaration. The wording in option 1a is open to be adjusted.  **Issue 1-6-1: Removal of TBD and []**  Ok with the recommended WF.  **Issue 1-7-1: Additional SCS/CBW combinations in the simulation summary**  Prefer option 1. |
| NTT DOCOMO | Issue 1-1-1: We prefer Option 2. From simulation results provided by some companies, MCS16 seems to be feasible with 1T1R. Thus, we could define the requirement for MCS16.  Issue 1-2-1: In LTE, channel model ETU600 which is based on the assumptions 240km/h and 2.7GHz was defined. Basically, NR HST deployment condition is similar as LTE. We couldn’t understand why multipath fading channel is not typical for NR HST but is typical for LTE HST. We believe that multipath fading channel also is typical for NR HST. In addition, we assume that some HST cells will be deployed to cover both normal speed UEs and high speed UEs, especially between rural and urban areas, multipath fading channel can be considered and the UE speed assumption of 240km/h is reasonable for such a deployment.  Issue 1-2-2: We still prefer Option 2. This channel model is also assumed in UE demodulation. We shouldn’t make different decision between UE and BS. In addition, multi-path fading channel also was considered in WI on LTE HST and ETU600 was introduced for both UE and BS. From these reasons, it is reasonable to introduce the requirements for multi-path fading channel with 600Hz and 1200Hz Doppler frequency for 15kHz SCS and 30kHz SCS, respectively.  To Ericsson’s comments:  In our understanding, it depends on operators whether to deploy HST cells close to rail way or not. In some deployment, we use large cells to cover both normal speed UE and high speed UE simultaneously. In some cases, the HST cells may be deployed far from rail way. In addition, between rural area and urban area, multi-path fading conditions is assumed due to buildings.  Issue 1-3-1: In our views, there is an advantage on cell coverages due to low PAPR at UE transmission. Even if similar required SNR at BS receiver, UE can transmit DFT signals with higher power than CP due to low PAPR of DFT. Especially for re-farming bands, DFT is one of the key features to ensure similar cell coverage as LTE. As a compromise, we proposed to introduce the requirement with limited parameters as proposed in Issue 1-3-3. In addition, we could consider another applicability rule that either DFT or CP will be tested for MCS2.  Issue 1-4-2: The three options seem to have the same meanings. We have no strong opinion but slightly prefer Option 3.  Issue 1-5-1: In our views, it is better to have a declaration of “350&500kph” since there is a possibility to use different algorisms for Doppler compensation. From this reason, we proposed Option 2b. However, we could compromise to Option 1a to move forward since implicit test pass was already agreed in the last meeting and which means that any BS that support 500km/h support 350km/h. In addition, this principle can be used for UL timing adjustment.  Issue 1-6-1: TBDs can be updated if enough simulation results are provided.  Issue 1-6-2: We agree with recommended WF.  Issue 1-7-1: We agree with recommended WF. |
| Intel | **Issue 1-2-1: Is multi-path fading channel under high Doppler value a common scenario?**  The answer on this question should be Yes, since we see requests from 2 operators to define corresponding test case. Also, it will be strange if we will have only UE HST multi-path fading requirements since in general reciprocity channel conditions are assumed. Will it mean that there is no need to verify BS receive processing in HST multi-path conditions?  **Issue 1-2-2: Specification of multi-path fading channel under high Doppler**  Agree with Option 2 but open for further discussion as proposed in Option 3.  Also, we would like to clarify some concerns regarding performance degradation in HST multi-path fading scenario due to small coherent time. Based on our evaluations practical channel estimation leads to small demodulation performance degradation compare to scenario with perfect channel estimation even for MCS 17 and at least for 600 Hz and 1200 Hz Doppler spread values for 15 kHz and 30 kHz SCS respectively.  To move forward on this issue we are wondering if companies can agree to define HST Tunnel with only MCS 2 and HST multi-path fading with MCS 16. |

### CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

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| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
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| R4-2006053 (Nokia) | [Moderator]: - Please observe the outcome of the chair guidance captured and discussed in sub-topic 1-6. - Depending on sub-topic 1-6, consider adding new minimum CBW requirements and FRCs (see R4-2007183 and R4-2007184) and other changes. |
| Ericsson   * Cover sheet: RAN4 should be R4.   Nokia: Not sure about this. Downlink the prefilled cover sheet does not fill this part, so it might not matter. Is there any reference on how to fill this? (RAN5 PRD 16 Version 1.1, points towards R4.)   * It might be good to add a statement, such as “subject to declaration”, after “… shall only apply to Wide Area Base Stations and Medium Range Base Stations”, otherwise, it would make HST requirements mandatory for all WA and MR BS.   Nokia: 38.104 does not contain a manufacturer declaration section, unlike 38.141-1/2. Hence, we followed the LTE approach of not making a specific reference to a declaration. Since this was endorsed in last meeting, we would ask Ericsson, if this presents a large point of contention, or if we can continue with the endorsed text?  Ericsson: We reviewed the text agreed last time regarding the fact that the requirement is only applied to WA and MR BS: “The performance requirements for PUSCH for high speed train shall only apply to Wide Area Base Stations and Medium Range Base Stations.”. The text risks implying that the PUSCH HST requirements are mandatory for those classes (“The requirements… shall apply…”). Although other text states that the requirement is optional, there could be some risk of perceived conflicting text or ambiguity in the specification. We propose a small fix to remove any ambiguity:  The performance requirements for PUSCH for high speed train ~~shall~~ only apply to Wide Area Base Stations and Medium Range Base Stations (subject to declaration).  Hopefully this is clearer and more acceptable to everyone,  A question: how to consider the tunnel scenario, is it a Local area deployment?  Nokia: Every manufacturer is free to declare the BS type as they please. However, given the strict RF power constraints for local area base stations (as well as other more strict RF requirements) it is probably not advantageous for a manufacturer to do so.  Ericsson: Thanks for the clarification. We just feel the tunnel scenario is kind of a Local area due to the small distance between BS and the train. But just like you said, vendors might not declare for it because of more strict requirements.  Nokia: Would like to clarify that manufacturers are free to declare only within the legal, regulatory, and safety constraints. |
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| R4-2006054 (Nokia) | [Moderator]: - Please observe the outcome of the chair guidance captured and discussed in sub-topic 1-6. - Depending on sub-topic 1-6, consider adding new minimum CBW requirements and FRCs (see R4-2007183 and R4-2007184) and other changes. |
| Ericsson  Cover sheet: RAN4 should be R4 |
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| R4-2006836 (Ericsson) | [Moderator]: - Depending on sub-topic 1-6, consider adding new minimum CBW requirements and FRCs. (See R4-2007183 and R4-2007184.)  Ericsson: Yes, we’ll update it. |
| Company B |
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| R4-2006837 (Ericsson) | [Moderator]: - Depending on sub-topic 1-6, consider adding new minimum CBW requirements and FRCs. (See R4-2007183 and R4-2007184.) |
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| R4-2007183 (DoCoMo) | [Moderator]: - Depending on sub-topic 1-6, consider removing new minimum CBW requirements and FRCs. (See R4-2007183 and R4-2007184.) |
| Ericsson:   * Cover sheet: rev should be “-“ not 0 * We reviewed the text agreed last time regarding the fact that the requirement is only applied to WA and MR BS: “The performance requirements for PUSCH for high speed train shall only apply to Wide Area Base Stations and Medium Range Base Stations.”. The text risks implying that the PUSCH HST requirements are mandatory for those classes (“The requirements… shall apply…”). Although other text states that the requirement is optional, there could be some risk of perceived conflicting text or ambiguity in the specification. We propose a small fix to remove any ambiguity:   The performance requirements for PUSCH for high speed train ~~shall~~ only apply to Wide Area Base Stations and Medium Range Base Stations (subject to declaration).  Hopefully this is clearer and more acceptable to everyone,  NTT DOCOMO: Thank you for the comment. According to TS36.104, there is a sentence “This requirement shall not be applied to Local Area BS and Home BS”. It seems to be better to use the same approach as LTE. i.e., add “This requirement shall not be applied to Local Area BS” instead of “The performance requirements for PUSCH for high speed train shall only apply to Wide Area Base Stations and Medium Range Base Stations”. This is not strong opinion, but we would like to confirm other companies’ views. |
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| R4-2007184 (DoCoMo) | [Moderator]: - Depending on sub-topic 1-6, consider removing new minimum CBW requirements and FRCs. (See R4-2007183 and R4-2007184.) |
| Ericsson:  Cover sheet: rev should be “-“ not 0 |
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## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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|  | **Status summary** |
| **Sub-topic#1-1** | **Sub-topic 1-1: 1T1R requirements**  *Tentative agreements:*  None  *Candidate options:*  **Issue 1-1-1: 1T1R requirements for the tunnel scenario - MCS configuration**   * Option 1: Only have MCS 2 requirements. * Option 2: Have MCS 2 and MCS16 requirements. * Option 3: Define HST Tunnel with only MCS 2 and HST multi-path fading with MCS 16.   *Recommendations for 2nd round:*  **Issue 1-1-1: 1T1R requirements for the tunnel scenario - MCS configuration**   * Continue the discussion in 2nd round. |
| **Sub-topic#1-2** | **Sub-topic 1-2: Multi-path fading channel under high Doppler**  *Tentative agreements:*  None  *Candidate options:*  **Issue 1-2-1: Is multi-path fading channel under high Doppler value a common scenario?**   * Option 1: Multi-path fading is a typical HST scenario. * Option 2: Multi-path fading is not a typical HST scenario. * Option 3: Multi-path fading should be a specific HST scenario and relevant requirements if introduced should be optional and BS declared basis.   **Issue 1-2-2: Specification of multi-path fading channel under high Doppler**   * Option 1: Do not specify requirements for multi-path fading channel models with high Doppler values. * Option 2: Specify PUSCH requirements for multi-path fading channel with maximum doppler shift of 600Hz and 1200Hz for 15kHz SCS and 30kHz SCS, respectively. * Option 3: If agreed to introduce the related requirement, the high Doppler with 600Hz and 1200Hz for 15 kHz and 30 kHz SCS can be regarded as the starting point for the feasibility study with HST requirement with high Doppler. * Option 4: Define HST Tunnel with MCS 2 and HST multi-path fading with MCS 16.   **Issue 1-2-3: Where to specify multi-path fading channel under high Doppler.**   * Option 1: If specified, introduce new PUSCH requirements for multi-path fading conditions in non-HST PUSCH section. * Option 2: Postpone after 1-2-2.   **Issue 1-2-4: Waveform, if multi-path fading channel under high Doppler is specified.**   * Option 1: Focus on the requirements with CP-OFDM waveform. * Option 2: Postpone after 1-2-2.   *Recommendations for 2nd round:*  **Issue 1-2-1: Is multi-path fading channel under high Doppler value a common scenario?**   * Do not further pursue this issue.  If this issue had led to a consensus, it could have informed the other discussion, but no consensus was reached.   **Issue 1-2-2: Specification of multi-path fading channel under high Doppler**   * Continue the discussion in 2nd round.   **Issue 1-2-3: Where to specify multi-path fading channel under high Doppler.**   * Postpone until issue 1-2-2 is decided.   **Issue 1-2-4: Waveform, if multi-path fading channel under high Doppler is specified.**   * Postpone until issue 1-2-2 is decided. |
| **Sub-topic#1-3** | **Sub-topic 1-3: DFT-s-OFDM waveform**  *Tentative agreements:*  None  *Candidate options:*  **Issue 1-3-1: Include requirements for DFT-s-OFDM waveform**   * Option 1b: Introduce PUSCH HST requirements for DFT-s-OFDM, with the following limited parameters as proposed in issue 1-3-3 and applicability rule to test either DFT-s-OFDM or CP-OFDM for MCS2.   + Antenna configuration: Only 1T2R   + MCS: Only MCS2   + CBW and SCS: Only 5MHz CBW/15kHz SCS and 10MHz CBW/ 30kHz SCS   + Velocity: Only 350km/h   + Applicability rule:     - If BS that declare to support HST for DFT-s-OFDM, BS vendor can choose either DFT-s-OFDM or CP-OFDM for the test with 1T2R, MCS2, 5MHz CBW/15kHz SCS or 10MHz CBW/30kHz SCS and 350km/h HST scenarios. (The number of tests is kept). * Option 2: Do not introduce PUSCH HST requirements for DFT-s-OFDM.   **Issue 1-3-2: If DFT-s-OFDM waveform is introduced, target speed.**   * Option 1: Only 500kph requirement. * Option 2: Postpone after 1-3-1. * Option 3: Only 350kph requirement.   *Recommendations for 2nd round:*  **Issue 1-3-1: Include requirements for DFT-s-OFDM waveform**   * Continue the discussion in 2nd round. Companies are encouraged to evaluate the latest compromise proposal in option 1b.   **Issue 1-3-2: If DFT-s-OFDM waveform is introduced, target speed.**   * Check if the option of 350kph only is also acceptable, to align with the compromise proposal in issue 1-3-1. Otherwise postpone until issue 1-3-1 is decided.   **Issue 1-3-3: If DFT-s-OFDM waveform is introduced, configuration.**   * No longer required. Is now part of the compromise proposal in issue 1-3-1. |
| **Sub-topic#1-4** | **Sub-topic 1-4: PUSCH applicability rules**  *Tentative agreements:*  **Issue 1-4-1: PUSCH implicit test passing applicability rule**   * Capture the following applicability rule in test specifications:   + “Unless otherwise stated, a BS that declares to support 500km/h (see D.1XX in table 4.6-1) and passes the tests for 500km/h, can also consider the tests for 350kph as passed.”   *Candidate options:*  **Issue 1-4-2: PUSCH 1T1R applicability rule**   * Option 1: Allow foregoing testing for 1T1R, when 1T2R is tested. This to be captured in applicability rule by changing previous rule (in the section 8.1.2.0 of TS 38.141-1) as follows:   + “In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the lowest number or two supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.” * Option 2b:   + In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), if one connector is supported, the tests with low MIMO correlation level shall apply only for either one connector or the second lowest number of supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration * Option 3:   + In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for either the lowest number of supported connectors or two connectors, in addition to the highest number of supported connectors, and the specific connectors used for testing are based on manufacturer declaration. * Option 4:   + In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the lowest number of supported connectors in addition to the highest number of supported connectors, and the specific connectors used for testing are based on manufacturer declaration. If the BS supports 1RX, the optionally 2 connectors may be tested (in addition to the highest number of connectors) in place of testing 1 connector. * Option 5:   + In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), if one connector is supported, the tests with low MIMO correlation level shall apply only for either one connector or the second lowest number of supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration. If one connector is not supported, the tests with low MIMO correlation level shall apply only for the lowest and highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.   *Recommendations for 2nd round:*  **Issue 1-4-1: PUSCH implicit test passing applicability rule**   * Tentative agreement is agreeable.   **Issue 1-4-2: PUSCH 1T1R applicability rule**   * Continue discussion in 2nd round. * Due to a productive discussion at the end of the 1st round, companies are encouraged to state their opinions on the newly clarified options 4 and 5. * Moderator sees it possible that either option 4 or option 5 will be quickly agreed upon in round 2. |
| **Sub-topic#1-5** | **Sub-topic 1-5: Manufacturer declaration**  *Tentative agreements:*  None.  *Candidate options:*  **Issue 1-5-1: PUSCH high speed support declaration for HST**   * Option 1a: Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Shared for PUSCH/UL TA.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h) for PUSCH and UL timing adjustment for HST. | x | x |  * Option 1b: Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Shared for PUSCH/PRACH/UL TA.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | Maximum supported speed for High Speed Train | Declaration of the maximum supported speed for High Speed Train scenarios. The declaration is chosen from the set {No HST support, 350 km/h, 500 km/h} and applicable to HST PUSCH, UL TA and HST PRACH. Speed(s) less than the declaration shall also be supported under this declaration. | x | x |  * Option 1c: Declare category of supported maximum speed. This can be either 350km/h or 500km/h. Only the corresponding requirements are tested. * Option 1d: Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Shared for PUSCH/UL TA.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h, or no HST support) for PUSCH and UL timing adjustment for HST. | x | x |  * Option 1e: Declare category of supported maximum speed. This can be either 350km/h or 500km/h. Only the corresponding requirements are tested.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | High speed train | Declaration of high speed train scenario support. | x | x | | D.109 | Maximum speed of high speed train for PUSCH | Declaration of supported maximum speed for high speed train scenario, i.e. 350 km/h or 500 km/h.  This declaration is applicable to PUSCH for high speed train and UL timing adjustment only if UE declares to support high speed train in D.108. | x | x |   *Recommendations for 2nd round:*  **Issue 1-5-1: PUSCH high speed support declaration for HST**   * Continue discussion in 2nd round. * Due to a productive discussion at the end of the 1st round, companies are encouraged to state their opinions on the new compromise options 1d and 1e. |
| **Sub-topic#1-6** | **Sub-topic 1-6: Specification writing**  *Tentative agreements:*  **Issue 1-6-1: Removal of TBD and []**  Each CR should be considered separately in the corresponding section of this document, this evaluation starts from the following goals:   * + Do not agree TS 38.104 CRs that introduce new TBDs or [], either postpone, or technically endorse, or change to no longer add new TBDs or [].     - Discuss, if [] can be removed and TBDs can be replaced in the draftCRs endorsed last meeting.     - Change all remaining [TBD] to TBD.     - Consider removing requirements with remaining TBD.   + For PUSCH in particular: Do not introduce minimum CBW requirements in CRs this meeting.   **Issue 1-6-2: HST test setup figures and test tolerances**   * Test specification CR authors to verify the need for new measurement setup figures and TTs.   + Remark: LTE has re-used the measurement setup figure for PUSCH in PUSCH HST (TS 36.141 I.3.2) by adding “HST” to heading and caption, as well as adding a note. LTE also added new PUSCH HST TTs (36.141 G.3). * Other delegates to check, if the additions in the CR are technically correct and sufficient.   *Candidate options:*  **Issue 1-6-1: Removal of TBD and []**   * Option 3: Firstly check if some companies have plan to submit new results or update their results in next meeting, if no, just agree CRs endorsed in last meeting and add SNR the requirements based on the latest results summary. All other newly submitted CRs for this meeting can only be endorsed if agreeable. * Option 4: TBDs can be updated, if enough simulation results are provided.   *Recommendations for 2nd round:*  **Issue 1-6-1: Removal of TBD and []**   * The tentative agreements and candidate options can directly be implemented in the evaluation of the CRs submitted to this meeting and don’t need to be officially agreed in the chairman minutes/WFs. Though they might be captured for informative purposes in the WF.   **Issue 1-6-2: HST test setup figures and test tolerances**   * Same as issue 1-6-1. |
| **Sub-topic#1-7** | **Sub-topic 1-7: Simulation summary management**  *Tentative agreements:*  **Issue 1-7-1: Additional SCS/CBW combinations in the simulation summary**   * Add 5MHz CBW/15kHz SCS, 10MHz CBW/30kHz SCS for PUSCH to simulation results summary.   *Candidate options:*  None  *Recommendations for 2nd round:*  **Issue 1-7-1: Additional SCS/CBW combinations in the simulation summary**   * The tentative agreement was already implemented in the simulation summary submitted to this meeting and doesn’t need to be officially captured in the chairman minutes/WFs. |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1  (allocated: R4-2008821) | WF on Rel-16 NR HST BS demodulation requirements | Nokia, Nokia Shanghai Bell |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |
| R4-2006254  (Revised to R4-2008822) | To be revised.  This simulation summary has been updated with results from Samsung, Huawei, and Intel, and needs to be revised. |
| R4-2006053 | To be revised.  Introduces TBDs into 38.104. |
| R4-2006054 | To be revised. |
| R4-2006836 | To be revised. |
| R4-2006837 | To be revised. |
| R4-2007183 | To be revised. |
| R4-2007184 | To be revised. |

## Discussion on 2nd round (if applicable)

~~Remark: Will be filled in for the revised version on Monday to guide and capture discussions in second round.~~

### Sub-topic 1-1: 1T1R requirements

**Issue 1-1-1: 1T1R requirements for the tunnel scenario - MCS configuration**

* Option 1 (Ericsson, Nokia, ZTE, Huawei): Only have MCS 2 requirements.
* Option 2 (Ericsson, Nokia, DCM): Have MCS 2 and MCS16 requirements.
* Option 3: Define HST Tunnel with only MCS 2 and HST multi-path fading with MCS 16.

*Recommendations for 2nd round:*

* Continue the discussion in 2nd round.

Company Comments:  
(Dialog; please do not modify earlier comments, add follow-up always at the bottom of the discussion.)

[Moderator]: Companies are invited to consider the compromise proposal (option 3), which limits the requirements to a single MCS, but has implications on multi-path fading issue 1-2-2.

[Company 1]:

[Company 2]:

[Company 1]:

Ericsson: We prefer include two MCS but we can compromise to only test MCS2. For tunnel scenario, we really don’t think multi-path fading channel is reasonable.

[Nokia]: Nokia is also fine with option 1 and 2. So, from our perspective we don’t need the compromise proposal.

[ZTE] We slightly prefer to MCS2 only since a lower data rate is expected under 1T1R if considering the power consumption at UE side compared with the case of 1T2R etc.

[Huawei] Still prefer only MCS 2.

[DCM]: We prefer Option 2. For Option3, the antenna configuration might not be clear. If antenna configuration for multi-path fading is 1x2 with Doppler frequency 600Hz and 1200Hz for 15kHz and 30kHz, respectively, we are fine with Option 3.

### Sub-topic 1-2: Multi-path fading channel under high Doppler

**Issue 1-2-1: Is multi-path fading channel under high Doppler value a common scenario?**

* Option 1: Multi-path fading is a typical HST scenario.
* Option 2: Multi-path fading is not a typical HST scenario (ZTE).
* Option 3: Multi-path fading should be a specific HST scenario and relevant requirements if introduced should be optional and BS declared basis.

*Recommendations for 2nd round:*

* Do not further pursue this issue.   
  If this issue had led to a consensus, it could have informed the other discussion, but no consensus was reached.

Company Comments:

[Moderator]: Recommend to not further pursue this issue. If this issue had led to a consensus, it could have informed the other discussion, but no consensus was reached.

[Company 1]:

[Company 2]:

[ZTE] In our analysis, multi-path fading channel is not a typical HST scenario under high Doppler value.

**Issue 1-2-2: Specification of multi-path fading channel under high Doppler**

* Option 1 (Ericsson, ZTE, Huawei): Do not specify requirements for multi-path fading channel models with high Doppler values.
* Option 2 (CMCC, DCM): Specify PUSCH requirements for multi-path fading channel with maximum doppler shift of 600Hz and 1200Hz for 15kHz SCS and 30kHz SCS, respectively.
* Option 3: If agreed to introduce the related requirement, the high Doppler with 600Hz and 1200Hz for 15 kHz and 30 kHz SCS can be regarded as the starting point for the feasibility study with HST requirement with high Doppler.
* Option 4: Define HST Tunnel with MCS 2 and HST multi-path fading with MCS 16.
* Option 5 (Ericsson, Nokia): Define HST multi-path fading with MCS 16 for open space scenario only.

*Recommendations for 2nd round:*

* Continue the discussion in 2nd round.

Company Comments:

[Moderator]: Companies are invited to consider the compromise proposal (option 4), which limits the requirements to a single MCS. Alternatively, we could think about an applicability rule to make the test declarable.

[Company 1]:

[Company 2]:

Ericsson: We can compromise to option 4, but only open area scenario could consider the multi-path fading introduction.

CMCC: we prefer option 2. For option 4, we have one question for clarification on the wording “HST multi-path fading with MCS 16”, does it mean that MCS16 is used for both multi-path fading channel with 600Hz doppler shift and multi-path fading channel with 1200Hz doppler shift?

[Nokia]: Regarding CMCC’s question, we think that option 4 does not make any assumptions about the multi-path fading Doppler values, so this would need to be discussed after option 4 is agreed (if it is agreed).  
We are OK to consider Ericsson’s compromise proposal, with the expectation that the doppler shift values will not be larger than that ones in option 2.

[ZTE] As stated in Issue 1-2-1, multipath fading channel is not a typical HST scenario with high Doppler value. Furthermore, multipath + a fixed frequency offset is not a proper model. It requires further study on proper modelling. So we prefer Option 1 at this stage.

[Huawei] Still prefer Option 1.

[Intel]: In our understanding reciprocity on DL and UL channel models is a general assumption for requirements definition. In this case we do not clearly understand why fixed frequency offset should be considered in HST-multi path fading channel model for UL when it is not considered for DL. The main characteristic of multi-path fading conditions is a Doppler spread, not Doppler shift as in single tap conditions. HST multi-path channel model and non-HST multi-path channel model is different only in terms of Doppler spread value. In this case can companies clarify what HST multi-path tunnel and open space exactly means (Option 5)?  
  
For option 4 it is reasonable to consider 600 and 1200 Hz as proposed in option 2 to align with UE requirements. And our preference is to choose same MCS value (16) for both FDD and TDD.

At current stage we do not think that it is reasonable to discuss whether HST multi-path is a typical condition or not. We already agreed to define requirements for DL and some confusion will arise if corresponding UL requirements will not be defined. Moreover, what is more important is that we have direct request from at least 2 operators. Prefer option 4.

[DCM]: We prefer Option 2.

For Option4, the antenna configuration might not be clear. If antenna configuration for multi-path fading is 1x2 with Doppler frequency 600Hz and 1200Hz for 15kHz and 30kHz, respectively, we are fine with Option 4.

For Option 5, what is the candidate Doppler frequency values? If the Doppler frequency values are considered from candidates more than 600Hz and 1200Hz for 15kHz SCS and 30kHz SCS, respectively, we can compromise to Option 5.

**Issue 1-2-3: Where to specify multi-path fading channel under high Doppler.**

* Option 1: If specified, introduce new PUSCH requirements for multi-path fading conditions in non-HST PUSCH section.
* Option 2: Postpone after 1-2-2.

*Recommendations for 2nd round:*

* Postpone until issue 1-2-2 is decided.

Company Comments:

[Company 1]:

[Company 2]:

**Issue 1-2-4: Waveform, if multi-path fading channel under high Doppler is specified.**

* Option 1: Focus on the requirements with CP-OFDM waveform.
* Option 2: Postpone after 1-2-2.

*Recommendations for 2nd round:*

* Postpone until issue 1-2-2 is decided.

Company Comments:

[Company 1]:

[Company 2]:

### Sub-topic 1-3: DFT-s-OFDM waveform

**Issue 1-3-1: Include requirements for DFT-s-OFDM waveform**

* Option 1b (Nokia, DCM): Introduce PUSCH HST requirements for DFT-s-OFDM, with the following limited parameters as proposed in issue 1-3-3 and applicability rule to test either DFT-s-OFDM or CP-OFDM for MCS2.
  + Antenna configuration: Only 1T2R
  + MCS: Only MCS2
  + CBW and SCS: Only 5MHz CBW/15kHz SCS and 10MHz CBW/ 30kHz SCS
  + Velocity: Only 350km/h
  + Applicability rule:
    - If BS that declare to support HST for DFT-s-OFDM, BS vendor can choose either DFT-s-OFDM or CP-OFDM for the test with 1T2R, MCS2, 5MHz CBW/15kHz SCS or 10MHz CBW/30kHz SCS and 350km/h HST scenarios. (The number of tests is kept).
* Option 2 (Ericsson, Nokia, ZTE, Huawei): Do not introduce PUSCH HST requirements for DFT-s-OFDM.
* Option 3: If the availability of DFT under HST could be confirmed by testing DFT under normal condition and CP-OFDM under HST, do not introduce PUSCH HST requirements for DFT-s-OFDM.

*Recommendations for 2nd round:*

* Continue the discussion in 2nd round.  
  Companies are encouraged to evaluate the latest compromise proposal in option 1b.

Company Comments:

[Moderator]: DoCoMo has proposed an extensive compromise proposal at the end of round 1 (see option 1b). The other companies are invited to evaluate, if it can be agreeable.  
It is the moderators understanding that the applicability rule of option 1b would leave it up to manufacturer declaration, if DFT-s-OFDM is tested at all.

[Company 1]:

[Company 2]:

Ericsson: We still prefer option 2 since we can’t see the coverage is the issue considering the HST BS typical deployment (along the railway). For those BS deployed far away railway and cover normal speed UE, then this scenario is similar to normal NR BS which is already conclude that no much difference between DFT-s-OFDM and CP-OFDM.

[Nokia]: We are fine with option 1 and 2, but our technical opinion has not changed: The difference between the waveforms is not big enough to justify introduction of dft-s testing.

[ZTE] Option 2. We don’t see the necessity, and it is also a bit too late.

Huawei: We still prefer Option 2 that not introduce PUSCH HST requirements for DFT-s-OFDM. Support of DFT-s-OFDM was already covered in Rel-15 normal performance requirements. Also, considering the good coverage for HST, it is not practical to use DFT-s-OFDM in HST, no need to define related performance requirements.

[DCM]: We still prefer Option 1b. However, we understand that it is difficult to reach consensus even if we assume the limited parameters and test cases. Our concern is that the HST performance for DFT-s-OFDM is not guaranteed by the test under HST. If the availability of DFT under HST could be confirmed by testing DFT under normal condition and CP-OFDM under HST, we could compromise to Option 2 to move forward.

[Moderator] Could DCM elaborate what how the “availability of DFT under HST could be confirmed by testing DFT under normal condition and CP-OFDM under HST,” could be confirmed?

**Issue 1-3-2: If DFT-s-OFDM waveform is introduced, target speed.**

* Option 1: Only 500kph requirement.
* Option 2 (Ericsson): Postpone after 1-3-1.
* Option 3: Only 350kph requirement.

*Recommendations for 2nd round:*

* Check if the option of 350kph only is also acceptable, to align with the compromise proposal in issue 1-3-1.  
  Otherwise postpone until issue 1-3-1 is decided.

Company Comments:

[Moderator]: The moderator would ask the proponents of option 1 to consider, if aligning with the issue 1-3-1 compromise proposal (1b) is possible, i.e., choosing option 3 here.

[Company 1]:

[Company 2]:

Ericsson: Option 2.

### Sub-topic 1-4: PUSCH applicability rules

**Issue 1-4-2: PUSCH 1T1R applicability rule**

* Option 1: Allow foregoing testing for 1T1R, when 1T2R is tested. This to be captured in applicability rule by changing previous rule (in the section 8.1.2.0 of TS 38.141-1) as follows:
  + “In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the lowest number or two supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.”
* Option 2b:
  + In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), if one connector is supported, the tests with low MIMO correlation level shall apply only for either one connector or the second lowest number of supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration
* Option 3:
  + In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for either the lowest number of supported connectors or two connectors, in addition to the highest number of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.
* Option 4: (Ericsson, Nokia)
  + In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the lowest number of supported connectors in addition to the highest number of supported connectors, and the specific connectors used for testing are based on manufacturer declaration. If the BS supports 1RX, the optionally 2 connectors may be tested (in addition to the highest number of connectors) in place of testing 1 connector.
* Option 5: (Ericsson, Huawei)
  + In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), if one connector is supported, the tests with low MIMO correlation level shall apply only for either one connector or the second lowest number of supported connectors, in addition to the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration. If one connector is not supported, the tests with low MIMO correlation level shall apply only for the lowest and highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.
* Option 6: (Nokia -preferred)
  + In high speed train requirements, unless otherwise stated, for a BS supporting different numbers of antenna connectors (for BS type 1-C) or TAB connectors (for BS type 1-H) (see D.37 in table 4.6-1), if one connector is supported, the tests with low MIMO correlation level shall apply only for either one connector or the second lowest number of supported connectors, in addition to the highest numbers of supported connectors (the highest number does not count as the second lowest), and the specific connectors used for testing are based on manufacturer declaration. If one connector is not supported, the tests with low MIMO correlation level shall apply only for the lowest and highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.

*Recommendations for 2nd round:*

* Due to a productive discussion at the end of the 1st round, companies are encouraged to state their opinions on the newly clarified options 4 and 5.
* Moderator sees it possible that either option 4 or option 5 will be quickly agreed upon in round 2.

Company Comments:

[Moderator]: Due to a productive discussion at the end of the 1st round, companies are encouraged to state their opinions on the newly clarified options 4 and 5. Please check the company comments section of Huawei in the 1st round for details.  
The moderator sees it possible that either option 4 or option 5 will be quickly agreed upon in round 2.

[Company 1]:

[Company 2]:

Ericsson: Option 4 or 5 are both OK to us.

[Nokia]: Both option 4 and 5 are fine for us, but option 5 is preferred.   
We remark that there is a technical difference between option 4 and option 5:  
 Option 4  
 BS declares to support 1,4 => BS needs to test (either 1 or 2) and 4.  
 BS declares to support 1,4,8 => BS needs to test 8 and (either 1 or 2).  
 Option 5 (Huawei understanding)  
 BS declares to support 1,4 => BS needs to test either 4 or (both 1 and 4).  
 BS declares to support 1,4,8 => BS needs to test 8 and (either 1 or 4).  
 Option 6 (Nokia understanding of option 5 stated expicitely)  
 BS declares to support 1,4 => BS needs to test (both 1 and 4).  
 BS declares to support 1,4,8 => BS needs to test 8 and (either 1 or 4).  
We also understand that the current wording of option 5 (i.e., the “in addition” part) prevents the situation, where {1 and 8} is declared, but only 8 is tested; since 8 is technically the second lowest number.

[ZTE] Option 5 preferred.

Huawei: For our understanding, this applicability rule is to give BS choice not to mandate to test 1Rx. We think Option 5 is clearer to handle the case that a BS supports 1Rx and 4Rx.

BS declares to support 1, 2 => BS needs to test either 2 or (both 1 and 2).   
 BS declares to support 1, 4 => BS needs to test either 4 or (both 1 and 4).  
 BS declares to support 1, 4, 8 => BS needs to test 8 and (either 1 or 4).

For Option 4, it will make reader confused that if BS not declares to support 2Rx but can choose 2Rx to test.

For Option 6, it means that BS declares to support 1, 2 => BS needs to test (both 1 and 2), which is not aligned with the original agreement.

[Nokia]: It was also Nokia's understanding that we don't mandate 1R testing, however we understood that, if 1R is not tested, at least 2R must be supported/tested.  
Though we can compromise to option 5, if it is common understanding that a BS that declares 1R, does never need to test it and does not necessarily need to support 2R.

### Sub-topic 1-5: Manufacturer declaration

**Issue 1-5-1: PUSCH high speed support declaration for HST**

* Option 1a: Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Shared for PUSCH/UL TA.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h) for PUSCH and UL timing adjustment for HST. | x | x |

* Option 1b (ZTE): Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Shared for PUSCH/PRACH/UL TA.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | Maximum supported speed for High Speed Train | Declaration of the maximum supported speed for High Speed Train scenarios. The declaration is chosen from the set {No HST support, 350 km/h, 500 km/h} and applicable to HST PUSCH, UL TA and HST PRACH. Speed(s) less than the declaration shall also be supported under this declaration. | x | x |

* Option 1c: Declare category of supported maximum speed. This can be either 350km/h or 500km/h. Only the corresponding requirements are tested.
* Option 1d (Nokia, DCM, ZTE): Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Shared for PUSCH/UL TA.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h, or no HST support) for PUSCH and UL timing adjustment for HST. | x | x |

* Option 1e (Ericsson, Nokia, Huawei, DCM): Declare category of supported maximum speed. This can be either 350km/h or 500km/h. Only the corresponding requirements are tested.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | High speed train | Declaration of high speed train scenario support. | x | x |
| D.109 | Maximum speed of high speed train for PUSCH | Declaration of supported maximum speed for high speed train scenario, i.e. 350 km/h or 500 km/h.  This declaration is applicable to PUSCH for high speed train and UL timing adjustment only if BS declares to support high speed train in D.108. | x | x |

*Recommendations for 2nd round:*

* Due to a productive discussion at the end of the 1st round, companies are encouraged to state their opinions on the new compromise options 1d and 1e.

Company Comments:

[Moderator]: Due to a productive discussion at the end of the 1st round, companies are encouraged to state their opinions on the new compromise options 1d and 1e. The main difference between the two being, how the “no HST support” is captured.  
It is the understanding of the moderator, that the large majority of companies are fine with the style of “no HST support” in option 1d.  
The decision in this sub-topic should make it easier to move forward in similar discussions on PRACH and UL TA.

[Company 1]:

[Company 2]:

Ericsson: We can go to option 1e due to the hard situation of PRACH declarations. It is more consistency for HST declaration.

[Nokia]: Both compromises 1d and 1e are fine.

[ZTE] Option 1b and 1d are ok with us.

Huawei: We think Option 1e is clearer.

[DCM]: We are fine with Option 1d and 1e.

### Sub-topic 1-6: Specification writing

**Issue 1-6-1: Removal of TBD and []**

* Option 3:  
  Firstly check if some companies have plan to submit new results or update their results in next meeting, if no, just agree CRs endorsed in last meeting and add SNR the requirements based on the latest results summary. All other newly submitted CRs for this meeting can only be endorsed if agreeable.
* Option 4: TBDs can be updated, if enough simulation results are provided.

*Recommendations for 2nd round:*

* The tentative agreements and candidate options can directly be implemented in the evaluation of the CRs submitted to this meeting and don’t need to be officially agreed in the chairman minutes/WFs. Though they might be captured for informative purposes in the WF.
* Please abstain from introducing the new min CBW test cases/requirements in this meeting. (Moderator, Ericsson)

Company Comments:

[Moderator]: Unless a request to the contrary is voiced here, companies with draft CRs are encouraged to capture the results from R4-2008822 (revision of “R4-2006254\_Summary of ideal and impairment results for NR HST demodulation requirements\_Samsung\_Huawei\_Intel.xlsm”) in their respective CRs.  
Please abstain from introducing the new min CBW test cases in this meeting (as they would introduce new TBs) and postpone such min CBW introduction to the next meeting.

[Company 1]:

[Company 2]:

Ericsson: For additional CBW requirements, we tend to introduce it in the next meeting but we have no strong opinions.

[DCM]: We are OK to introduce the new min CBW test cases in the next meeting.

### Sub-topic 1-7: Simulation summary management

Sub-topic closed in 1st round.

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2006053 (Nokia) >  R4-2008823 | [Moderator]: - Please observe the outcome of the chair guidance captured and discussed in sub-topic 1-6. - Depending on sub-topic 1-6, consider adding new minimum CBW requirements and FRCs (see R4-2007183 and R4-2007184) and other changes. |
| Ericsson   * Cover sheet: RAN4 should be R4.   Nokia: Not sure about this. Downlink the prefilled cover sheet does not fill this part, so it might not matter. Is there any reference on how to fill this? (RAN5 PRD 16 Version 1.1, points towards R4.)   * It might be good to add a statement, such as “subject to declaration”, after “… shall only apply to Wide Area Base Stations and Medium Range Base Stations”, otherwise, it would make HST requirements mandatory for all WA and MR BS.   Nokia: 38.104 does not contain a manufacturer declaration section, unlike 38.141-1/2. Hence, we followed the LTE approach of not making a specific reference to a declaration. Since this was endorsed in last meeting, we would ask Ericsson, if this presents a large point of contention, or if we can continue with the endorsed text?  Ericsson: We reviewed the text agreed last time regarding the fact that the requirement is only applied to WA and MR BS: “The performance requirements for PUSCH for high speed train shall only apply to Wide Area Base Stations and Medium Range Base Stations.”. The text risks implying that the PUSCH HST requirements are mandatory for those classes (“The requirements… shall apply…”). Although other text states that the requirement is optional, there could be some risk of perceived conflicting text or ambiguity in the specification. We propose a small fix to remove any ambiguity:  The performance requirements for PUSCH for high speed train ~~shall~~ only apply to Wide Area Base Stations and Medium Range Base Stations (subject to declaration).  Hopefully this is clearer and more acceptable to everyone,  A question: how to consider the tunnel scenario, is it a Local area deployment?  Nokia: Every manufacturer is free to declare the BS type as they please. However, given the strict RF power constraints for local area base stations (as well as other more strict RF requirements) it is probably not advantageous for a manufacturer to do so.  Ericsson: Thanks for the clarification. We just feel the tunnel scenario is kind of a Local area due to the small distance between BS and the train. But just like you said, vendors might not declare for it because of more strict requirements.  Nokia: Would like to clarify that manufacturers are free to declare only within the legal, regulatory, and safety constraints. |
|  |
| R4-2006054 (Nokia)  >  R4-2008824 | [Moderator]: - Please observe the outcome of the chair guidance captured and discussed in sub-topic 1-6. - Depending on sub-topic 1-6, consider adding new minimum CBW requirements and FRCs (see R4-2007183 and R4-2007184) and other changes. |
| Ericsson  Cover sheet: RAN4 should be R4 |
|  |
| R4-2006836 (Ericsson)  >  R4-2008825 | [Moderator]: - Depending on sub-topic 1-6, consider adding new minimum CBW requirements and FRCs. (See R4-2007183 and R4-2007184.)  Ericsson: Yes, we’ll update it. |
| Session chair: missing CR number in cover page  Ericsson: The CR number and revision hav been added. |
|  |
| R4-2006837 (Ericsson)  >  R4-2008826 | [Moderator]: - Depending on sub-topic 1-6, consider adding new minimum CBW requirements and FRCs. (See R4-2007183 and R4-2007184.) |
|  |
|  |
| R4-2007183 (DoCoMo)  >  R4-2008827 | [Moderator]: - Depending on sub-topic 1-6, consider removing new minimum CBW requirements and FRCs. (See R4-2007183 and R4-2007184.) |
| Ericsson:   * Cover sheet: rev should be “-“ not 0 * We reviewed the text agreed last time regarding the fact that the requirement is only applied to WA and MR BS: “The performance requirements for PUSCH for high speed train shall only apply to Wide Area Base Stations and Medium Range Base Stations.”. The text risks implying that the PUSCH HST requirements are mandatory for those classes (“The requirements… shall apply…”). Although other text states that the requirement is optional, there could be some risk of perceived conflicting text or ambiguity in the specification. We propose a small fix to remove any ambiguity:   The performance requirements for PUSCH for high speed train ~~shall~~ only apply to Wide Area Base Stations and Medium Range Base Stations (subject to declaration).  Hopefully this is clearer and more acceptable to everyone,  NTT DOCOMO: Thank you for the comment. According to TS36.104, there is a sentence “This requirement shall not be applied to Local Area BS and Home BS”. It seems to be better to use the same approach as LTE. i.e., add “This requirement shall not be applied to Local Area BS” instead of “The performance requirements for PUSCH for high speed train shall only apply to Wide Area Base Stations and Medium Range Base Stations”. This is not strong opinion, but we would like to confirm other companies’ views. |
|  |
| R4-2007184 (DoCoMo)  >  R4-2008828 | [Moderator]: - Depending on sub-topic 1-6, consider removing new minimum CBW requirements and FRCs. (See R4-2007183 and R4-2007184.) |
| Ericsson:  Cover sheet: rev should be “-“ not 0 |
|  |
| R4-2006270 (CATT)  >  R4-2008871 | [Moderator]: This CR was **missing in the 1st round summary**. Please check! Introduces manufacturer declarations for PUSCH/PRACH.  @CATT: Please adapt to the outcomes of the manufacturer declarations.  If no consensus is found in this meeting, it might be necessary to postpone this CR. |
|  |
|  |
| R4-2006271 (CATT)  >  R4-2008872 | [Moderator]: This CR was **missing in the 1st round summary**. Please check! Introduces manufacturer declarations for PUSCH/PRACH.  @CATT: Please adapt to the outcomes of the manufacturer declarations.  If no consensus is found in this meeting, it might be necessary to postpone this CR. |
|  |
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### Discussions on the reflector

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| --- |
| **Email discussion 1: Testing tolerance.** |
| [CATT]:  Thanks for initialing the 2nd round discussion. In terms of test tolerance, 0.3dB for AWGN and 0.6dB for fading channel are currently used in the simulation result summary for NR HST as indicated in the following table. To achieve alignment for TT and derive the SNR levels in CRs, more clarifications seem to be needed.   |  |  | | --- | --- | | **Subclause** | **Maximum Test System uncertainty for conducted and OTA** | | 8 PUSCH, UL timing adjustment (TBD for Scenario X), PRACH with single antenna port and fading channel | ± 0.6 dB | | 8 PUSCH, UL timing adjustment, PRACH with single antenna port and AWGN | ± 0.3 dB |   Please let me know if you have any concern or question.  [Nokia]:  At first I was a bit surprised how the simulation summary excel derives the test requirements from the minimum requirements for HST, which is different from non-HST.  However, it is in line with LTE. So Nokia does not have a concern here (see spec copy paste below this email).  [3**8**.141-1]  [3**6**.141] |

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| --- |
| **Email discussion 2: Updated applicability text.** |
| [Moderator]:  We would like to point out the following proposal by Ericsson that is a bit hidden in the CR comments:  “  Ericsson:  We reviewed the text agreed last time regarding the fact that the requirement is only applied to WA and MR BS:  “The performance requirements for PUSCH for high speed train shall only apply to Wide Area Base Stations and Medium Range Base Stations.”  The text risks implying that the PUSCH HST requirements are mandatory for those classes (“The requirements… shall apply…”). Although other text states that the requirement is optional, there could be some risk of perceived conflicting text or ambiguity in the specification. We propose a small fix to remove any ambiguity:  “The performance requirements for PUSCH for high speed train shall only apply to Wide Area Base Stations and Medium Range Base Stations (subject to declaration).”  Hopefully this is clearer and more acceptable to everyone  “  This proposed text change would affect all HST BS demod CRs.  At least Nokia would be fine with the change.  Please comment either in this email thread, or directly in the summary (section 1.3.2: “R4-2006053 (Nokia)”), if this proposal is acceptable.  [Ericsson]  Thanks for merging our comments to the latest summary.  For the PUSCH HST application, I need to restate our proposal here since there are a delete slash missing in Axel’s email.  The performance requirements for PUSCH for high speed train ~~shall~~ only apply to Wide Area Base Stations and Medium Range Base Stations (subject to declaration).  We hope it is clearer and  more acceptable.  [Moderator -remark]: Discussed in parallel in the various concerned CR sections of this summary document. |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: PRACH requirements (6.17.2.2.2)

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

This section contains T-docs with corresponding proposals and observations submitted to the agenda item “6.17.2.2.2 PRACH requirements”, as well as, any PRACH requirement related observations and proposals submitted to other agenda items.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-20xxxxx | Company A | Proposal 1:  Observation 1: |
| R4-2006270 (AI 6.17.2.2) | CATT | Moderator: CR  PRACH   |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.109 | PRACH format for HST | Declaration of restricted set type A and/or restricted set type B and/or A2 for high speed mode and/or B4 for high speed mode and/or C2 for high speed mode for HST PRACH. | x | x | |
| R4-2006271 | CATT | Moderator: CR  PRACH   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | D.110 | PRACH format for HST | Declaration of restricted set type A and/or restricted set type B and/or A2 for high speed mode and/or B4 for high speed mode and/or C2 for high speed mode for HST PRACH. | c | x | n/a | |
| R4-2006666 (AI 6.17.2.2.1) | ZTE Wistron Telecom AB | Manufacturer declaration maximum supported speed for HST  **Proposal 1: Introduce a new declaration item (Option 1) shown in Table -1.**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | Maximum supported speed for High Speed Train | Declaration of the maximum supported speed for High Speed Train scenarios. The declaration is chosen from the set {No HST support, 350 km/h, 500 km/h} and applicable to HST PUSCH, UL TA and HST PRACH. Speed(s) less than the declaration shall also be supported under this declaration. | x | x | |
| R4-2006055 (AI 6.17.2.2.2) | Nokia, Nokia Shanghai Bell | High speed support declaration  **Proposal 1: RAN4 to include the two new manufacturer declarations “PRACH high speed train long format support” and “PRACH high speed train short format support”, as detailed above.**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.10X | PRACH high speed train long format support | Declaration of the supported long PRACH format restricted set configurations for high speed train categories, i.e., not declared (no high speed train support), restricted set type A, restricted set type B, or both. | x | x | | D.10X | PRACH high speed train short format support | Declaration of high speed train support for each supported short PRACH format. I.e., declare for each of the supported formats of the set {A2, B4, C2}, if high speed mode is supported. | x | x |     TDLC300-100 propagation conditions for long preamble formats  Observation 1: Performance differences in LTE specifications are only due to the usage of different sequences and not different demodulation implementation performances.  **Proposal 2: It is not necessary to repeat testing of TDLC300-100 FO=400Hz for restricted set long formats.**  Agreeing on SNR values  **Proposal 3: Unless new simulation results are received, capture the SNR values summarized in R4-2005573 in the PRACH CRs.**  HST test setup figures and TTs  Observation 2: RAN4 should verify, if HST PRACH additions to “Measurement of performance requirements” (TT definitions in TS 38.131-1/2 appendix C.3) and “Measurement system set-up” for “performance requirements” (appendix D) are required; similar to R4-2003272. |
| R4-2006667 | ZTE Wistron Telecom AB | Multipath fading channel  Observation 1: Non-LOS propagation should be avoided in a high speed train scenario from performance aspect.  Observation 2: A multipath fading channel plus a fixed frequency offset is not a proper model on a radio propagation with parital LOS and partial fading channel. Some other model, e.g., a Rician channel model may be more applicable.  **Proposal 1: There is no practical meaning to introduce requirements under TDLC300-100 plus 400Hz frequency offset for HST scenarios, thus such requirements should not be introduced before any further study.** |
| R4-2006834 | Ericsson | Table organization of high-speed train requirement sections for PRACH 350kph in specifications  Observation 1: The purpose of including long format 0 restricted sets is to have a smooth transition from LTE to NR  **Proposal 1: Add format 0 in the table caption to clarify confusion and modify the agreement accordingly as “add new table for long format 0 restricted set type A/B”**  High speed support declaration 350kph PRACH  Observation 2: A BS cannot declare support of 350kph short format PRACH. No remarkable performance degradation by employing PRACH short formats with 500kph HST is observed from previous simulation results, when comparing to the normal mode PRACH short formats. Note that the test configurations differ only in Doppler shift.  **Proposal 2: Consider explicitly explaining format-speed mapping for PRACH HST.**  **Proposal 3: RAN4 to consider adding requirements of 350kph on short format PRACH with preliminary condition that, allow implicit test passing for short format 350kph when declaring support of short format PRACH HST.**  Section organization of high-speed train requirements for PRACH in specifications  Observation 3: If the fading channels with 400Hz frequency offset were to be included (which we think is not reasonable), there will be confusion whether to include it in the new section or not, due to the wording of agreement.  **Proposal 4: Delay the discussion on “Section organization of high-speed train requirements for PRACH in specifications” to after the fading cases are decided.**  Multi-path fading channel test cases  Observation 4: No reasoning is provided to link multi-path fading with high speed scenario.  **Proposal 5: There is no need for RAN4 to include multi-path fading test cases in PRACH HST.** |
| R4-2007185 | NTT DOCOMO, INC. | Propagation conditions for long preamble format  **Proposal 1: RAN4 introduces TDLC300-100 for PRACH restricted set type A and B (Keep original agreement made in RAN4 #92bis).**  Declaration for PRACH high speed support  **Proposal 2: RAN4 introduces the following new declaration for PRACH high speed support:**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | D.1xx | High speed support for PRACH | Declaration of high speed support for PRACH: restricted set type A, restricted set type B, format A2 for high speed, format B4 for high speed or/and format C2 for high speed. | x | x | x | |
| R4-2007204 | Huawei, HiSilicon | Moderator: CR TS 38.104 |
| R4-2007205 | Huawei, HiSilicon | Moderator: CR TS 38.141-1 |
| R4-2007206 | Huawei, HiSilicon | Moderator: CR TS 38.141-2 |
| R4-2007207 | Huawei, HiSilicon | Propagation conditions for long preamble format  **Proposal 1: Prefer not to define TDLC300-100 fading channel with frequency offset of 400Hz requirements for long preamble formats.** |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 2-1: TDLC300-100 propagation conditions for long preamble formats

*Sub-topic description:*

In RAN4#94-bis-e, no conclusion was reached with respect to testing TDLC300-100 FO=400Hz with restricted sets:

|  |
| --- |
| * TDLC300-100 propagation conditions for long preamble formats   + Option 1: Do not to introduce TDLC300-100 fading channel with frequency offset of 400Hz requirements for long preamble formats for HST requirements.   + Option 2: Introduce TDLC300-100 fading channel with frequency offset of 400Hz requirements for long preamble formats for HST requirements. |

*Open issues and candidate options before e-meeting:*

**Issue 2-1-1: TDLC300-100 propagation conditions for long preamble formats**

* Proposals
  + Option 1 (ZTE): Do not to introduce TDLC300-100 fading channel with frequency offset of 400Hz requirements for long preamble formats for HST requirements, before any further study.
  + Option 2 (Huawei, Ericsson,, ZTE, CATT): Do not to introduce TDLC300-100 fading channel with frequency offset of 400Hz requirements for long preamble formats for HST requirements.
  + Option 3 (DoCoMo): Introduce TDLC300-100 for PRACH restricted set type A and B.
* Recommended WF
  + Collect further company views during 1st round.  
    Please give feedback on how strong the respective request is.

### Sub-topic 2-2: Manufacturer declaration

*Sub-topic description:*

In RAN4#94-bis-e, it was agreed to declare high speed support based on restricted set support in long formats and based on high speed mode for short format (instead of declaration by target speed):

|  |
| --- |
| * High speed support declaration for HST PRACH - speed or feature based   + Allow BS to declare support for HST including [restricted set type A] and/or [restricted set type B] and/or [A2 for high speed mode] and/or [B4 for high speed mode] and/or [C2 for high speed mode] |

It now remains to define the specific manufacturer declaration categories and clarify the corresponding testing.

*Open issues and candidate options before e-meeting:*

**Issue 2-2-1: PRACH high speed support declaration for HST**

* Proposals
  + Option 1a (CATT, CMCC, DoCoMo): One declaration table entry for short and long format

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.109 | PRACH format for HST | Declaration of restricted set type A and/or restricted set type B and/or A2 for high speed mode and/or B4 for high speed mode and/or C2 for high speed mode for HST PRACH. | x | x |

* + Option 1b (DoCoMo): One declaration table entry for short and long format

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| D.1xx | High speed support for PRACH | Declaration of high speed support for PRACH: restricted set type A, restricted set type B, format A2 for high speed, format B4 for high speed or/and format C2 for high speed. | x | x | x |

* + Option 1c (Huawei, CATT): One declaration table entry for short and long format.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | High speed train | Declaration of high speed train scenario support. | x | x |
| D.109 | Maximum speed of high speed train for PUSCH | Declaration of supported maximum speed for high speed train scenario, i.e. 350 km/h or 500 km/h.  This declaration is applicable to PUSCH for high speed train and UL timing adjustment only if UE declares to support high speed train in D.108. | x | x |
| D.110 | PRACH format for high speed train | Declaration of supported PRACH format(s) for high speed train scenario, i.e. format 0 restricted set type A, format 0 restricted set type B, format A2, format B4, format C2.  This declaration is applicable to HST PRACH only if UE declares to support high speed train in D.108. | x | x |

* + Option 2 (Nokia, Ericsson, DoCoMo): Include the two new manufacturer declarations “PRACH high speed train long format support” and “PRACH high speed train short format support”,

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.10X | PRACH high speed train long format support | Declaration of the supported long PRACH format restricted set configurations for high speed train categories, i.e., not declared (no high speed train support), restricted set type A, restricted set type B, or both. | x | x |
| D.10X | PRACH high speed train short format support | Declaration of high speed train support for each supported short PRACH format. I.e., declare for each of the supported formats of the set {A2, B4, C2}, if high speed mode is supported. | x | x |

* + Option 3 (ZTE): Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Shared for PUSCH/PRACH/UL TA.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | Maximum supported speed for High Speed Train | Declaration of the maximum supported speed for High Speed Train scenarios. The declaration is chosen from the set {No HST support, 350 km/h, 500 km/h} and applicable to HST PUSCH, UL TA and HST PRACH. Speed(s) less than the declaration shall also be supported under this declaration. | x | x |

* Recommended WF
  + Collect further company views during 1st round.
  + Companies are encouraged to give feedback on
    - Which of the three main options (long&short vs. long/short vs. PUSCH&PRACH&ULTA) they see the most advantageous solution and why?
    - Which declaration wording option they see as best or propose new exact wording options.

**Issue 2-2-2 (new): Test applicability for long PRACH format restricted set type A and B**

* Proposals
  + Option 1 (Huawei): Additionally, test applicability for long PRACH format restricted set type A and B needs to be defined if BS supports both types.

|  |
| --- |
| 8.1.2.1.x Applicability of requirements for different restricted set types of long PRACH format 0  Unless otherwise stated, PRACH requirement tests for long PRACH format 0 with restricted set Type A and B shall apply only for the restricted set type declared to be supported (see D.110 in table 4.6-1). If both restricted set type A and type B are declared to be supported, the tests shall be done for type B; the same chosen mapping type shall then be used for all tests. |

* + Option 2: No applicability rule required
* Recommended WF
  + Collect further company views during 1st round.

### Sub-topic 2-3: Revisiting of previous agreements

*Sub-topic description*

One company raised several requests for clarification of some of the previous PRACH agreements.

*Open issues and candidate options before e-meeting:*

**Issue 2-3-1: Table organization of high-speed train requirement sections for PRACH 350kph in specifications**

* Proposals
  + Option 1 (Ericsson, ZTE, Huawei, CATT): Add format 0 in the table caption to clarify confusion and modify the agreement accordingly as “add new table for long format 0 restricted set type A/B”.
    - Add new table for long format 0 restricted set type A.  
      Add new table for long format 0 restricted set type B
  + Option 2 (DoCoMo): Keep previous agreement:
    - Add new table for long format restricted set type A.  
      Add new table for long format restricted set type B.
* Recommended WF
  + Collect further company views during 1st round.

**Issue 2-3-2: High speed support declaration 350kph PRACH - Explicit format-speed mapping**

* Proposals
  + Option 1a (ZTE): Explicitly explain format-speed mapping for PRACH HST in specification.
  + Option 1b (Ericsson, CATT): Explicitly explain format-speed mapping for PRACH HST in specification.  
    Capture the following text:
    - A BS claiming to support short format high speed must test all the requirements of long format 0 high speed, even if it has passed the tests for short format high speed.
  + Option 2 (DoCoMo): Explicit explanation of format-speed mapping for PRACH HST in specification is not required.
* Recommended WF
  + Collect further company views during 1st round.

**Issue 2-3-3: High speed support declaration 350kph PRACH - 350kph short format requirements**

* Proposals
  + Option 1 (Ericsson, CMCC, CATT): Add requirements of 350kph on short format PRACH with preliminary condition that, allow implicit test passing for short format 350kph when declaring support of short format PRACH HST.
  + Option 2 (Nokia, ZTE, Huawei, DoCoMo): Keep previous agreement:
    - No implicit test passing.  
      A BS claiming to support 350kph must test all the requirements of 350kph, even if it has passed the tests for 500kph.
    - For 350km/h velocity, use PRACH format 0  
      For 500km/h velocity, use PRACH format A2/B4/C2
      * FFS if PRACH format 0 shall be used.
    - For 500km/h velocity, no extra requirements for PRACH format 0.
* Recommended WF
  + Collect further company views during 1st round.

**Issue 2-3-4: Section organization of high-speed train requirements for PRACH in specifications**

* Proposals
  + Option 1 (): Delay the discussion on “Section organization of high-speed train requirements for PRACH in specifications” to after the fading cases are decided.
  + Option 2 (Ericsson, Huawei, CATT): Keep previous agreement:
    - New section for requirements specified with frequency offset >=625Hz.  
      Example, 8.4.2.3 Minimum requirements for high speed train
* Recommended WF
  + Collect further company views during 1st round.

### Sub-topic 2-4: Specification writing

*Sub-topic description*

With the PRACH requirement organization and simulation contributions having become quite stable, RAN4 can go ahead and finalize the specifications.  
However, it remains to verify the additional need for additions for HST in the measurement set-up and test tolerance definition.

Additionally, the cleaning of the specification TS 38.**104** ahead of ITU submission, will have an impact on the HST PRACH CR treatment in this meeting, as indicated in the following guidance provided by the RAN4 Chair (Steven) and Demod co-chair (Haijie) to the moderators of the relevant email discussions:

[See email in sub-topic 1-6.]

*Open issues and candidate options before e-meeting:*

**Issue 2-4-1: Removal of TBD and []**

* Proposals
  + Option 1 (Nokia): Agreeing on SNR values.  
    Unless new simulation results are received, capture the SNR values summarized in R4-2005573 in the PRACH CRs
  + Option 2: (RAN4 chair and demod session chair):   
     Submitted TS 38.104 CRs could be technically endorsed.  
     Submitted TS 38.141-1/2 CRs could be agreed.  
     Try to resolve TBDs and [].
  + Option 3 (Huawei)  
    Firstly check if some companies have plan to submit new results or update their results in next meeting, if no, just agree CRs endorsed in last meeting and add SNR the requirements based on the latest results summary. All other newly submitted CRs for this meeting can only be endorsed if agreeable.
* Recommended WF
  + Do not agree TS 38.104 CRs that introduce new TBDs or [], either postpone, or technically endorse, or change to no longer add new TBDs or [].
    - Discuss, if [] can be removed and TBDs can be replaced in the draftCRs endorsed last meeting.
    - Change all remaining [TBD] to TBD.
    - Consider removing requirements with remaining TBD.

**Issue 2-4-2: HST test setup figures and test tolerances**

* Proposals
  + Option 1 (Nokia): Verify if further HST PUSCH additions to “Measurement of performance requirements” (TT definitions in TS 38.131-1/2 appendix C.3) and “Measurement system set-up” for “performance requirements” (appendix D) are required; similar to R4-2003272.
* Recommended WF
  + Test specification CR authors to verify the need for new measurement setup figures and TTs.
    - Remark: LTE has re-used the measurement setup figure for PRACH in PRACH HST (TS 36.141 I.3.2) by adding “HST” to heading and caption, as well as adding a note.   
      Please work together with the PUSCH test specification CR authors.  
      LTE also added new PRACH HST TTs (36.141 G.3).
  + Other delegates to check, if the additions in the CR are technically correct and sufficient.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Issue 2-1-1:  Issue 2-1-2:  ….  Others: |
| Ericsson | **Issue 2-1-1: TDLC300-100 propagation conditions for long preamble formats**  Agree with Option 2. Similar to the discussion on HST PUSCH, at the first, we don’t think multi-path fading is a typical HST scenario. At the second, the proposed multi-path fading channel test cases have already been included in the normal modes, i.e., the long format 0 multi-path fading test configurations are the same for normal mode and HST scenario. To be specific, the performance difference is quite negligible that the allowed range size for ideal results from different companies is even larger.  **Issue 2-2-1: PRACH high speed support declaration for HST**  We can go for Option 2. It would be better to declare separately to avoid too many “and/or”. But “high speed mode” could be “high speed train”?  **Issue 2-3-1: Table organization of high-speed train requirement sections for PRACH 350kph in specifications**  It just to clarify which long format is used in the table.  **Issue 2-3-2: High speed support declaration 350kph PRACH - Explicit format-speed mapping**  Since our agreements on “No implicit test passing for HST PRACH” is stated by speed, then it will cause confusion about the PRACH format and the speed. It would be good to modify the wording of “No implicit test passing for HST PRACH” to “format” based.  **Issue 2-3-3: High speed support declaration 350kph PRACH - 350kph short format requirements**  An interesting scenario will be a BS only supporting short format could not declare the support of 350kph since there is no corresponding requirement. In another words, how to handle a BS can pass 350km/h HST PUSCH test but only support short format? Yes, it is discussed in the last meetings, but it seems have no good solution for this situation. We don’t have strong opinion to introduce this requirement. We just want to bring up this question again and wait for a better explanation and solution from companies.  **Issue 2-3-4: Section organization of high-speed train requirements for PRACH in specifications**  We can agree with Option 2 after second thinking.  **Issue 2-4-2: HST test setup figures and test tolerances**  Similar to HST PUSCH, we need further check. But for now, we don’t think new TTs are needed. |
| CMCC | Issue 2-1 (exactly, it is Issue 2-2-1): Option 1a, which is aligned with the agreements in the last meeting.  Issue 2-3-3: we are OK with option 1. |
| ZTE | Issue 2-1-1 TDLC300-100 for long preamble formats  In our views, Option 1 and 2 are the same, which is our preference.  Issue 2-2-1 PRACH high speed support declaration for HST  For declaration, Option 3 is the simplest solution and with future proof when more speeds are added. The tricky part is for HST PRACH since requirements with different preamble formats are specified for different speeds, so our proposal is to take this option for declaration, but for test applicability for HST PRACH we can exclude implicit tests for HST PRACH for 350km/h and 500km/h. In other words, if maximum supported speed is declared to be 500km/h, an additional tests for HST PRACH are required for 350km/h.  Issue 2-3-1 Table organization of HST requirement sections for PRACH 350kph in specs.  Indicating which exact long format preamble is more clear, so Option 1 is ok to us.  Issue 2-3-2 High speed support declaration 350kph PRACH – explicit format-speed mapping  Clarifying format-speed mapping is helpful.  Issue 2-3-3 High speed support declaration 350kph PRACH – 350kph short format requirements  For the time being, we don’t see the necessity of adding 350kph short format requirements (Option 2).  Issue 2-3-4 Section organization of HST requirements for PRACH in specs  We agree with Ericsson’s observation that there may be a confusion on multi-path fading channel.  Issue 2-4-1 Removal of TBD and []  WF recommended by Moderator seems reasonable to us.  Issue 2-4-2 HST test setup figures and test tolerances  WF recommended by Moderator seems reasonable to us. |
| Nokia, Nokia Shanghai Bell | **Issue 2-1-1: TDLC300-100 propagation conditions for long preamble formats**  Following Huawei’s contribution [R4-2007207] we were surprised to learn about possible issues with choosing restricted sets, resulting in performance gaps of up to 1.5dB. Hence we remove our support for “not define”, albeit we still prefer to not define. In case TDLC is specified, it should be in the HST section, as we previously decided to split HST and non-HST along feature lines, and not along speed lines.  **Issue 2-2-1: PRACH high speed support declaration for HST**  Since we decided in the previous meeting to split HST and non-HST along feature lines, and not along speed lines, it seems logical to us also split the declaration. This will also make it easier to read, as we don’t merge different features in one declaration.  The request from Ericsson to capture the “0” for long format 0 seems reasonable to us.  **Issue 2-3-1: Table organization of high-speed train requirement sections for PRACH 350kph in specifications**  Both options are fine for Nokia.  **Issue 2-3-2: High speed support declaration 350kph PRACH - Explicit format-speed mapping**  We are fine with both options. We would request to have a text proposal from Ericsson on how option 1 is to be captured.  **Issue 2-3-3: High speed support declaration 350kph PRACH - 350kph short format requirements**  We object to having short format requirements for 350kph. We have previously explicitly agreed to not have such requirements. During simulation delivery and the surround discussions, it was also generally recognized that short format PRACH is not an issue at 500kph. Any BS that supports short formats should not have an issue to achieve 500kph, thus fallback to 350kph is not necessary.  **Issue 2-3-4: Section organization of high-speed train requirements for PRACH in specifications**  Nokia thinks that the previous agreement should be upheld, until a specific conflict is identified. In which case we can re-examine the previous agreement. However, we don’t expect for such a scenario to arise.  **Issue 2-4-1: Removal of TBD and []**  Each CR should be considered separately in the corresponding section of this document. But the recommended WF seems like a good starting point for this evaluation.  **Issue 2-4-2: HST test setup figures and test tolerances**  Each CR should be considered separately in the corresponding section of this document. But the recommended WF seems like a good starting point for this evaluation. |
| Huawei, HiSilicon | **Issue 2-1-1: TDLC300-100 propagation conditions for long preamble formats**  Still prefer Option 2. It is not practical scenario for NR HST.  **Issue 2-1: PRACH high speed support declaration for HST**  By considering the declaration proposal in Topic #1 for PUSCH requirements, overall our proposals are as following:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | High speed train | Declaration of high speed train scenario support. | x | x | | D.109 | Maximum speed of high speed train for PUSCH | Declaration of supported maximum speed for high speed train scenario, i.e. 350 km/h or 500 km/h.  This declaration is applicable to PUSCH for high speed train and UL timing adjustment only if UE declares to support high speed train in D.108. | x | x | | D.110 | PRACH format for high speed train | Declaration of supported PRACH format(s) for high speed train scenario, i.e. format 0 restricted set type A, format 0 restricted set type B, format A2, format B4, format C2.  This declaration is applicable to HST PRACH only if UE declares to support high speed train in D.108. | x | x |   Additionally test applicability for long PRACH format restricted set type A and B needs to be defined if BS supports both types:   |  | | --- | | 8.1.2.1.x Applicability of requirements for different restricted set types of long PRACH format 0  Unless otherwise stated, PRACH requirement tests for long PRACH format 0 with restricted set Type A and B shall apply only for the restricted set type declared to be supported (see D.110 in table 4.6-1). If both restricted set type A and type B are declared to be supported, the tests shall be done for type B; the same chosen mapping type shall then be used for all tests. |   **Issue 2-3-1: Table organization of high-speed train requirement sections for PRACH 350kph in specifications**  Considering that restricted sets type A and type B are applicable for several long PRACH formats: format 0/1/2/3, it is ok for us to add format 0 to avoid confusion.  **Issue 2-3-2: High speed support declaration 350kph PRACH – Explicit format-speed mapping**  By using our proposal about the declaration, no need for explicit format-speed mapping.  **Issue 2-3-3: High speed support declaration 350kph PRACH – 350kph short format requirements**  Keep previous agreements: No additionally define 350k/h related requirements for short PRACH formats. Especially the implicitly testing for 350km/h and 500km/h.  **Issue 2-3-4: Section organization of high-speed train requirements for PRACH in specifications**  Keep previous agreements. No need to delay this agreed part because of undecided issues for other test cases.  Issue 2-4-2:  As per the agreed work split, Huawei is responsible for this part work, we are sorry for missing this part, based on our current investigation, we think that the existing “Measurement system and set-up” defined in TS 38.141-1 Annex D.5 and D.6 can be reused for HST. Discussion about TT = 0.3dB is needed. If agreements can be reached during this meeting, either prepare CR during this meeting or for next meeting is fine for us. |
| CATT | **Issue 2-1-1: TDLC300-100 propagation conditions for long preamble formats**  Ok with option 2.  **Issue 2-2-1: PRACH high speed support declaration for HST**  Prefer one row in table for PRACH declaration. Option 1a, 1c, 2 seem to have the same meaning, and the wording should be aligned as much as possible to avoid unnecessary confusion.  **Issue 2-3-1: Table organization of high-speed train requirement sections for PRACH 350kph in specifications**  Perfer option 1.  **Issue 2-3-2: High speed support declaration 350kph PRACH - Explicit format-speed mapping**  Prefer option 1b. It is more friendly to the reader who are not participating in the discussion.  **Issue 2-3-3: High speed support declaration 350kph PRACH - 350kph short format requirements**  Perfer option 1. If the explicit format-speed mapping is specified in specs, no need to add requirements of 350km/h for PRACH short format for the sake of implicit test passing.  **Issue 2-3-4: Section organization of high-speed train requirements for PRACH in specifications**  Prefer option 2.  **Issue 2-4-1: Removal of TBD and []**  Ok with the recommended WF. |
| NTT DOCOMO | **Issue 2-1-1:** We still prefer Option 3. First of all, it was already agreed to introduce the requirements for long format 0 with restricted set type A and B under TDLC300-100 (Note: the agreement was made in RAN4 #92 R4-1910128). We should respect the original agreement.  **RAN4 #92 R4-1910128**   * ***Frequency offset under fading for PRACH format 0***   + ***Frequency offset for restricted set Type A and B***      - ***TDLC300-100 with FO 400 Hz***   Secondly, there is no concern on work load since there are enough simulation results to define the requirements according to the latest simulation summary. Thirdly, multipath fading condition is typical condition for HST cells as we mentioned in PUSCH HST.  Issue 2-2-1: Option 1a/1b/2 are acceptable for us. For Option 3, it is not aligned with the previous agreement.  Issue 2-3-1: We prefer Option 2. The format number is already captured in the table, so we think there is no confusion.  Issue 2-3-2: We prefer Option 2. As mentioned above, any PRACH format can be used for any UE speed. It depends on declaration. Therefore, no explicit explanation of format-speed mapping is needed.  Issue 2-3-3: Basically, we can use any PRACH format for any UE speed. It depends on declaration. Therefore, no explicit explanation of format-speed mapping is needed, then no further discussion on this issue is needed.  Issue 2-4-2: We agree with recommended WF. |
|  |  |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| R4-2007204 (Huawei) | [Moderator]: - Please observe the outcome of the chair guidance captured and discussed in sub-topic 2-4. |
| Ericsson   * Cover sheet:   + rev should be “-“   + category should B   “RAN4” should be “R4” |
|  |
| R4-2007205 (Huawei) | Ericsson: same as R4-2007204, could delete the void tables as well? |
| Company B |
|  |
| R4-2007206 (Huawei) | Ericsson: same as R4-2007204 |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#2** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |
| **Sub-topic#2-1** | **Sub-topic#2-1: TDLC300-100 propagation conditions for long preamble formats**  *Tentative agreements:*  None  *Candidate options:*  **Issue 2-1-1: TDLC300-100 propagation conditions for long preamble formats**   * Option 1: Do not to introduce TDLC300-100 fading channel with frequency offset of 400Hz requirements for long preamble formats for HST requirements, before any further study. * Option 2: Do not to introduce TDLC300-100 fading channel with frequency offset of 400Hz requirements for long preamble formats for HST requirements. * Option 3: Introduce TDLC300-100 for PRACH restricted set type A and B.   *Recommendations for 2nd round:*  **Issue 2-1-1: TDLC300-100 propagation conditions for long preamble formats**   * Continue discussion in 2nd round. * It is remarked, that given previous agreements, FO=400Hz would place these requirements outside of the high speed train section. |
| **Sub-topic#2-2** | **Sub-topic#2-2: Manufacturer declaration**  *Tentative agreements:*  None  *Candidate options:*  **Issue 2-2-1: PRACH high speed support declaration for HST**   * Option 1a: One declaration table entry for short and long format  |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.109 | PRACH format for HST | Declaration of restricted set type A and/or restricted set type B and/or A2 for high speed mode and/or B4 for high speed mode and/or C2 for high speed mode for HST PRACH. | x | x |  * Option 1c: One declaration table entry for short and long format.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | High speed train | Declaration of high speed train scenario support. | x | x | | D.110 | PRACH format for high speed train | Declaration of supported PRACH format(s) for high speed train scenario, i.e. format 0 restricted set type A, format 0 restricted set type B, format A2, format B4, format C2.  This declaration is applicable to HST PRACH only if UE declares to support high speed train in D.108. | x | x |  * Option 2: Include the two new manufacturer declarations “PRACH high speed train long format support” and “PRACH high speed train short format support”,  |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.10X | PRACH high speed train long format support | Declaration of the supported long PRACH format restricted set configurations for high speed train categories, i.e., not declared (no high speed train support), restricted set type A, restricted set type B, or both. | x | x | | D.10X | PRACH high speed train short format support | Declaration of high speed train support for each supported short PRACH format. I.e., declare for each of the supported formats of the set {A2, B4, C2}, if high speed mode is supported. | x | x |  * Option 3: Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Shared for PUSCH/PRACH/UL TA.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | Maximum supported speed for High Speed Train | Declaration of the maximum supported speed for High Speed Train scenarios. The declaration is chosen from the set {No HST support, 350 km/h, 500 km/h} and applicable to HST PUSCH, UL TA and HST PRACH. Speed(s) less than the declaration shall also be supported under this declaration. | x | x |   **Issue 2-2-2 (new): Test applicability for long PRACH format restricted set type A and B**   * Option 1 (Huawei): Additionally, test applicability for long PRACH format restricted set type A and B needs to be defined if BS supports both types.  |  | | --- | | 8.1.2.1.x Applicability of requirements for different restricted set types of long PRACH format 0  Unless otherwise stated, PRACH requirement tests for long PRACH format 0 with restricted set Type A and B shall apply only for the restricted set type declared to be supported (see D.110 in table 4.6-1). If both restricted set type A and type B are declared to be supported, the tests shall be done for type B; the same chosen mapping type shall then be used for all tests. |  * Option 2: No applicability rule required   *Recommendations for 2nd round:*  **Issue 2-2-1: PRACH high speed support declaration for HST**   * Continue discussion in 2nd round. * This declaration is encouraged to be aligned with any style chosen in PUSCH. * The two most supported options are option 1a and option 2. Companies are encouraged to evaluate comprising to one or both of these.   **Issue 2-2-2 (new): Test applicability for long PRACH format restricted set type A and B**   * Continue discussion in 2nd round. |
| **Sub-topic#2-3** | **Sub-topic#2-3: Revisiting of previous agreements**  *Tentative agreements:*  **Issue 2-3-4: Section organization of high-speed train requirements for PRACH in specifications**   * Keep previous agreement:   + New section for requirements specified with frequency offset >=625Hz. Example, 8.4.2.3 Minimum requirements for high speed train   *Candidate options:*  **Issue 2-3-1: Table organization of high-speed train requirement sections for PRACH 350kph in specifications**   * Proposals   + Option 1: Add format 0 in the table caption to clarify confusion and modify the agreement accordingly as “add new table for long format 0 restricted set type A/B”.     - Add new table for long format 0 restricted set type A. Add new table for long format 0 restricted set type B   + Option 2: Keep previous agreement:     - Add new table for long format restricted set type A. Add new table for long format restricted set type B.   **Issue 2-3-2: High speed support declaration 350kph PRACH - Explicit format-speed mapping**   * Option 1b: Explicitly explain format-speed mapping for PRACH HST in specification. Capture the following text proposal for discussion:   + A BS claiming to support short format high speed must test all the requirements of long format 0 high speed, even if it has passed the tests for short format high speed. * Option 2: Explicit explanation of format-speed mapping for PRACH HST in specification is not required.   **Issue 2-3-3: High speed support declaration 350kph PRACH - 350kph short format requirements**   * Option 1: Add requirements of 350kph on short format PRACH with preliminary condition that, allow implicit test passing for short format 350kph when declaring support of short format PRACH HST. * Option 2: Keep previous agreement:   + No implicit test passing. A BS claiming to support 350kph must test all the requirements of 350kph, even if it has passed the tests for 500kph.   + For 350km/h velocity, use PRACH format 0 For 500km/h velocity, use PRACH format A2/B4/C2     - FFS if PRACH format 0 shall be used.   + For 500km/h velocity, no extra requirements for PRACH format 0.   *Recommendations for 2nd round:*  **Issue 2-3-1: Table organization of high-speed train requirement sections for PRACH 350kph in specifications**   * Continue discussion in 2nd round. * In case of sustained opposition to option 1, the previous agreement is to be kept.   **Issue 2-3-2: High speed support declaration 350kph PRACH - Explicit format-speed mapping**   * Continue discussion in 2nd round. * In case of sustained opposition to option 1b, the previous agreement is to be kept.   **Issue 2-3-3: High speed support declaration 350kph PRACH - 350kph short format requirements**   * Continue discussion in 2nd round. * In case of sustained opposition to option 1, the previous agreement is to be kept.   **Issue 2-3-4: Section organization of high-speed train requirements for PRACH in specifications**   * The consensus of “keep previous agreement” is agreeable. It does not need to be captured in the official minutes. |
| **Sub-topic#2-4** | **Sub-topic#2-4: Specification writing**  *Tentative agreements:*  **Issue 2-4-1: Removal of TBD and []**  Each CR should be considered separately in the corresponding section of this document, this evaluation starts from the following goals:   * + Do not agree TS 38.104 CRs that introduce new TBDs or [], either postpone, or technically endorse, or change to no longer add new TBDs or [].     - Discuss, if [] can be removed and TBDs can be replaced in the draftCRs endorsed last meeting.     - Change all remaining [TBD] to TBD.     - Consider removing requirements with remaining TBD.   **Issue 2-4-2: HST test setup figures and test tolerances**   * Test specification CR authors to verify the need for new measurement setup figures and TTs.   + Remark: LTE has re-used the measurement setup figure for PUSCH in PUSCH HST (TS 36.141 I.3.2) by adding “HST” to heading and caption, as well as adding a note. LTE also added new PUSCH HST TTs (36.141 G.3). * Other delegates to check, if the additions in the CR are technically correct and sufficient.   *Candidate options:*  **Issue 2-4-1: Removal of TBD and []**   * Option 3: Firstly check if some companies have plan to submit new results or update their results in next meeting, if no, just agree CRs endorsed in last meeting and add SNR the requirements based on the latest results summary. All other newly submitted CRs for this meeting can only be endorsed if agreeable.   *Recommendations for 2nd round:*  **Issue 2-4-1: Removal of TBD and []**   * The tentative agreements and candidate options can directly be implemented in the evaluation of the CRs submitted to this meeting and don’t need to be officially agreed in the chairman minutes/WFs. Though they might be captured for informative purposes in the WF.   **Issue 2-4-2: HST test setup figures and test tolerances**   * Same as issue 2-4-1. |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 | None | None |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |
| R4-2007204 | To be revised.  Introduces TBDs in 38.104. |
| R4-2007205 | To be revised. |
| R4-2007206 | To be revised. |

## Discussion on 2nd round (if applicable)

~~Remark: Will be filled in for the revised version on Monday to guide and capture discussions in second round.~~

### Sub-topic 2-1: TDLC300-100 propagation conditions for long preamble formats

**Issue 2-1-1: TDLC300-100 propagation conditions for long preamble formats**

* Option 1: Do not to introduce TDLC300-100 fading channel with frequency offset of 400Hz requirements for long preamble formats for HST requirements, before any further study.
* Option 2 (Ericsson, Nokia, ZTE, Huawei): Do not to introduce TDLC300-100 fading channel with frequency offset of 400Hz requirements for long preamble formats for HST requirements.
* Option 3 (Nokia, DCM): Introduce TDLC300-100 for PRACH restricted set type A and B.
* Option 4 (Ericsson, DCM): Introduce TDLC300-100 fading channel with frequency offset of 400Hz requirements for long preamble 0 restricted set type A and B in **non**-HST sections.

*Recommendations for 2nd round:*

* It is remarked, that given previous agreements, FO=400Hz would place these requirements outside of the high speed train section.

Company Comments:  
(Dialog; please do not modify earlier comments, add follow-up always at the bottom of the discussion.)

[Company 1]:

[Company 2]:

[Company 1]:

Ericsson: We prefer Option 2, but we can compromise that this requirement is added in non-HST section if it is agreed to introduced.

[Nokia]: Since it has been shown that using restricted set can have a substantial performance impact, depending on BS implementation, we are fine (and slightly prefer) to introduce TDLC300-100 FO400.  
According to previous agreements (split on feature, not speed), we don’t see PRACH being captured in dedicated HST/non-HST sections. But this is a bit debatable, since restricted set was discussed as being high speed only, on the manufacturer declarations under discussion strongly tend in this direction.

[ZTE] Option 2 is preferred.

[DCM]: We prefer Option 3 to follow the agreement in RAN4 #92 R4-19101282, but we can compromise to Option 4.

### Sub-topic 2-2: Manufacturer declaration

**Issue 2-2-1: PRACH high speed support declaration for HST**

* Option 1a: One declaration table entry for short and long format

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.109 | PRACH format for HST | Declaration of restricted set type A and/or restricted set type B and/or A2 for high speed mode and/or B4 for high speed mode and/or C2 for high speed mode for HST PRACH. | x | x |

* Option 1c (Ericsson, Huawei): One declaration table entry for short and long format.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | High speed train | Declaration of high speed train scenario support. | x | x |
| D.110 | PRACH format for high speed train | Declaration of supported PRACH format(s) for high speed train scenario, i.e. format 0 restricted set type A, format 0 restricted set type B, format A2, format B4, format C2.  This declaration is applicable to HST PRACH only if BS declares to support high speed train in D.108. | x | x |

* Option 2 (Nokia-preferred, ZTE, DCM): Include the two new manufacturer declarations “PRACH high speed train long format support” and “PRACH high speed train short format support”,

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.10X | PRACH high speed train long format support | Declaration of the supported long PRACH format 0 restricted set configurations for high speed train categories, i.e., not declared (no high speed train support), restricted set type A, restricted set type B, or both. | x | x |
| D.10X | PRACH high speed train short format support | Declaration of high speed train support for each supported short PRACH format. I.e., declare for each of the supported formats of the set {A2, B4, C2}, if high speed mode is supported. | x | x |

* Option 3: Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). Shared for PUSCH/PRACH/UL TA.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | Maximum supported speed for High Speed Train | Declaration of the maximum supported speed for High Speed Train scenarios. The declaration is chosen from the set {No HST support, 350 km/h, 500 km/h} and applicable to HST PUSCH, UL TA and HST PRACH. Speed(s) less than the declaration shall also be supported under this declaration. | x | x |

*Recommendations for 2nd round:*

* This declaration is encouraged to be aligned with any style chosen in PUSCH.
* The two most supported options are option 1a and option 2. Companies are encouraged to evaluate comprising to one or both of these.

Company Comments:

[Moderator]: The two most supported options are option 1a and option 2. Companies are encouraged to consider compromising to either one or both of them.  
This declaration is encouraged to be aligned with any style chosen in PUSCH.

[Company 1]:

[Company 2]:

Ericsson: We tend to Option 1c since this style can be used for PUSCH and UL TA too. But a statement in 1c “This declaration is applicable to HST PRACH only if UE declares to support high speed train in D.108.” , Here, should “UE” be “BS” ?

[Nokia] We don’t think that option 1c is valid. Previously we decided to declare by feature and not by speed, hence there should not be an option to declare high speed support.  
We need to declare by feature (with the option to not declare at all).  
Hence we see option 2 as the best solution, please note that we added a “0” to make it clear that only format 0 needs to be declared (i.e., other formats don’t share the same restricted set capabilities, and we don’t have requirements for other formats).

[ZTE] Option 2 is ok to us.

[Huawei] Prefer Option 2, this format is aligned with declaration for PUSCH HST in Issue 1-5-1, and also align with the existing declaration for PRACH normal performance requirements [D.103] that include all PPRACH format:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.103 | PRACH format and SCS | Declaration of the supported PRACH format(s) as specified in TS 38.211 [17], i.e., format: 0, A1, A2, A3, B4, C0, C2.  Declaration of the supported SCS(s) per supported PRACH format with short sequence, as specified in TS 38.211 [17], i.e., 15 kHz, 30 kHz or both. | x | x |

[Moderator]: Does Huawei mean option 1c instead of option 2? Huawei has added their name next to 1c above.

[DCM]: We are OK with Option 2. We shouldn’t declare supported velocity for PRACH HST.

**Issue 2-2-2 (new): Test applicability for long PRACH format restricted set type A and B**

* Option 1 (Ericsson, Nokia, ZTE, Huawei): Additionally, test applicability for long PRACH format restricted set type A and B needs to be defined if BS supports both types.

|  |
| --- |
| 8.1.2.1.x Applicability of requirements for different restricted set types of long PRACH format 0  Unless otherwise stated, PRACH requirement tests for long PRACH format 0 with restricted set Type A and B shall apply only for the restricted set type declared to be supported (see D.110 in table 4.6-1). If both restricted set type A and type B are declared to be supported, the tests shall be done for type B; the same chosen mapping type shall then be used for all tests. |

* Option 2: No applicability rule required

*Recommendations for 2nd round:*

* Continue discussion in 2nd round.

Company Comments:

[Company 1]:

[Company 2]:

Ericsson: We can accept Option 1 for long format. But we have a question that, do we also need a applicability rule for short format if long format applicability rule is agreed?

[Nokia]: Fine for both options, with preference for option 1.

[ZTE]: Prefer option 1.

[Huawei]: Option 1 is reasonable.

[DCM]: We would like to confirm the applicability rule in LTE. It should be aligned with LTE.

### Sub-topic 2-3: Revisiting of previous agreements

**Issue 2-3-1: Table organization of high-speed train requirement sections for PRACH 350kph in specifications**

* Proposals
  + Option 1 (Ericsson, Nokia, ZTE, Huawei, DCM): Add format 0 in the table caption to clarify confusion and modify the agreement accordingly as “add new table for long format 0 restricted set type A/B”.
    - Add new table for long format 0 restricted set type A.  
      Add new table for long format 0 restricted set type B
  + Option 2 (Ericsson, Nokia, ZTE, DCM): Keep previous agreement:
    - Add new table for long format restricted set type A.  
      Add new table for long format restricted set type B.

*Recommendations for 2nd round:*

* In case of sustained opposition to option 1, the previous agreement is to be kept.

Company Comments:

[Moderator]: One company has raised concerns with this change. If these concerns are sustained, the previous agreement should not be modified. However, a large majority of companies have expressed the view that option 1 captures the original intent and does not constitute a technical change.

[Company 1]:

[Company 2]:

Ericsson: We can compromise to Option 2 if everyone think it’s OK.

[Nokia]: Fine for both option, with preference to option 1.

[ZTE]: Both options are ok.

[Huawei]: Option 1 is clearer considering other long PRACH format.

[DCM]: Both options are fine.

**Issue 2-3-2: High speed support declaration 350kph PRACH - Explicit format-speed mapping**

* Option 1b (Ericsson, Nokia, ZTE): Explicitly explain format-speed mapping for PRACH HST in specification.  
  Capture the following text proposal for discussion:
  + A BS claiming to support short format high speed must test all the requirements of long format 0 high speed, even if it has passed the tests for short format high speed.
* Option 2 (Ericsson, Nokia, ZTE, Huawei, DCM): Explicit explanation of format-speed mapping for PRACH HST in specification is not required.

*Recommendations for 2nd round:*

* In case of sustained opposition to option 1b, the previous agreement is to be kept.

Company Comments:

[Moderator]: In case of sustained opposition to option 1b, the previous agreement should not be modified.   
Could proponents of option 1b, give an explicit example of how such an explicit format-speed mapping can look and where it would be captured?

[Company 1]:

[Company 2]:

Ericsson: We tend to 1b, but we can compromise to option 2.

[Nokia]: Fine for both.

[ZTE]: Both are ok.

[Huawei]: We prefer Option 2 and do not agree with Option 1, we should not mandate BS to support both long and short PRACH formats.

[DCM]: We prefer Option 2. Any PRACH formats can be used for both target UE velocity 350 and 500.

**Issue 2-3-3: High speed support declaration 350kph PRACH - 350kph short format requirements**

* Option 1(ZTE): Add requirements of 350kph on short format PRACH with preliminary condition that, allow implicit test passing for short format 350kph when declaring support of short format PRACH HST.
* Option 2 (Ericsson, Nokia, Huawei): Keep previous agreement:
  + No implicit test passing.  
    A BS claiming to support 350kph must test all the requirements of 350kph, even if it has passed the tests for 500kph.
  + For 350km/h velocity, use PRACH format 0  
    For 500km/h velocity, use PRACH format A2/B4/C2
    - FFS if PRACH format 0 shall be used.
  + For 500km/h velocity, no extra requirements for PRACH format 0.

*Recommendations for 2nd round:*

* In case of sustained opposition to option 1, the previous agreement is to be kept.

Company Comments:

[Moderator]: In case of sustained opposition to option 1, the previous agreement should not be modified.

[Company 1]:

[Company 2]:

Ericsson: we can accept Option 2 if we have a clear PRACH declaration.

[Nokia]: It was previously decided to not have short format 350kph requirements.

[ZTE] Option 1 if we revisit the previous agreement.

[Huawei]: Keep previous agreement.

### Sub-topic 2-4: Specification writing

**Issue 2-4-1: Removal of TBD and []**

* Option 3:  
  Firstly check if some companies have plan to submit new results or update their results in next meeting, if no, just agree CRs endorsed in last meeting and add SNR the requirements based on the latest results summary. All other newly submitted CRs for this meeting can only be endorsed if agreeable.

*Recommendations for 2nd round:*

* The tentative agreements and candidate options can directly be implemented in the evaluation of the CRs submitted to this meeting and don’t need to be officially agreed in the chairman minutes/WFs. Though they might be captured for informative purposes in the WF.

Company Comments:

[Moderator]: Unless a request to the contrary is voiced here, companies with draft CRs are encouraged to capture the results from R4-2008822 (revision of “R4-2006254\_Summary of ideal and impairment results for NR HST demodulation requirements\_Samsung\_Huawei\_Intel.xlsm”) in their respective CRs.

[Company 1]:

[Company 2]:

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2007204 (Huawei)  >  R4-2008829 | [Moderator]: - Please observe the outcome of the chair guidance captured and discussed in sub-topic 2-4. |
| Ericsson   * Cover sheet:   + rev should be “-“   + category should B   “RAN4” should be “R4” |
|  |
| R4-2007205 (Huawei)  >  R4-2008830 | Ericsson: same as R4-2007204, could delete the void tables as well? |
| Company B |
|  |
| R4-2007206 (Huawei)  >  R4-2008831 | Ericsson: same as R4-2007204 |
| Company B |
|  |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #3: UL timing adjustment requirements (6.17.2.2.3)

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

This section contains T-docs with corresponding proposals and observations submitted to the agenda item “6.17.2.2.3 UL timing adjustment requirements”, as well as, any UL timing adjustment requirement related observations and proposals submitted to other agenda items.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-20xxxxx | Company A | Proposal 1:  Observation 1: |
| R4-2006266 | CATT | PUSCH UL TA  **Proposal 2: For PUSCH UL TA, it is proposed to declare category of supported maximum speed (Option 1).**   * Option 1: If 500kph UL TA scenarios are defined, Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). If 500kph is supported and successfully tested, then 350kph does not need to be tested.   **Proposal 3: No declaration for scenario X is needed (Same approach as LTE) (Option 3)**   * Option 3: No declaration for scenario X is needed. (Same approach as LTE).   **Proposal 4: If UL TA and PUSCH high speed declaration possibilities match, then they should be shared between PUSCH UL TA and PUSCH HST (Option 2).**   * Option 2: If UL TA and PUSCH high speed declaration possibilities match, then they should be shared between PUSCH UL TA and PUSCH HST. |
| R4-2006267 | CATT | UL TA  **Proposal 2: Do not specify scenario “X” (Option 3).**  Option 3: Do not specify scenario “X”. |
| R4-2006270 | CATT | Moderator: CR  PUSCH UL TA   |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h) for PUSCH and UL timing adjustment for HST. | x | x | |
| R4-2006271 | CATT | Moderator: CR  PUSCH UL TA   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | D.109 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h) for PUSCH and UL timing adjustment for HST. | c | x | n/a | |
| R4-2006769 | CMCC | UL TA additional scenario “X”  **Proposal 2: for UL timing adjustment, it is proposed to specify requirements for scenario X, and no declaration for scenario X is needed.** |
| R4-2006666 | ZTE Wistron Telecom AB | Manufacturer declaration maximum supported speed for HST  **Proposal 1: Introduce a new declaration item (Option 1) shown in Table -1.**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | Maximum supported speed for High Speed Train | Declaration of the maximum supported speed for High Speed Train scenarios. The declaration is chosen from the set {No HST support, 350 km/h, 500 km/h} and applicable to HST PUSCH, UL TA and HST PRACH. Speed(s) less than the declaration shall also be supported under this declaration. | x | x | |
| R4-2006056 | Nokia, Nokia Shanghai Bell | Organization of HST requirements for UL TA 500kph in specs  Observation 1: High speed scenarios over 250kph should be captured together.  **Proposal 1: RAN4 to** **capture the 500kph UL TA scenario in the same table as the 350kph UL TA scenario.**  High speed support declaration  Observation 2: In RAN4#94-bis-e, there was a general consensus for option 1 captured in the 2nd round summary.  **Proposal 2: RAN4 to adapt the following high speed support declaration for UL TA: If 500kph UL TA scenarios are defined, Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). If 500kph is supported and successfully tested, then 350kph does not need to be tested.**  High speed support declaration and applicability for 120kph HST UL TA  Observation 3: It is our general understanding that UL TA requirements for 120kph are applicable to all BS, even those that do not support high speed train. In this case, option 2 and 3 are equal.  **Proposal 3: RAN4 to agree that scenario X (120kph) needs to be tested independently of the [PUSCH UL timing alignment high speed train support] manufacturer declaration.**  Re-use of high speed support declaration for HST UL TA  Observation 4: Both options, re-use of PUSCH declaration and separate UL TA support declaration, technically feasible. Neither impacts the BS test procedure negatively.  Additional scenario X  N/A  Additional SCS/CBW combinations  **Proposal 4: RAN4 to not add new SCS/CBW combinations for UL TA, as the performance does not sufficiently differ.**  Agreeing on SNR values  **Proposal 5: Unless new simulation results are received, capture the SNR values summarized in R4-2005573 in the UL TA CRs.**  HST test setup figures and TTs  Observation 6: RAN4 should verify, if HST UL TA additions to “Measurement of performance requirements” (TT definitions in TS 38.131-1/2 appendix C.3) and “Measurement system set-up” for “performance requirements” (appendix D) are required; similar to R4-2003272. |
| R4-2006255 | CATT | Moderator: CR TS 38.141-2 |
| R4-2006256 | CATT | Moderator: CR TS 38.141-2 |
| R4-2006257 | CATT | Moderator: Simulation results.  **Proposal 1: add 500kph UL TA scenraio Z to simulation results summary.** |
| R4-2006269 | CATT | Requirement organization  **Proposal 1: Requirements for different scenarios can be organised in the same table (Option 1).**  Additional simulation assumptions  **Proposal 2: Add simulation assumptions for 5MHz CBW/15KHz SCS and 10Mhz CBW/30KHz SCS to simulation summary for agreed UL timing adjustment scenarios (Option 1)** |
| R4-2006321 | Samsung | Moderator: CR TS 38.141-1 |
| R4-2006322 | Samsung | Moderator: CR TS 38.141-1 |
| R4-2006324 | Samsung | Organization of UL timing requirement  **Proposal 1: Captured the requirements for different scenarios in separable tables**  High speed support declaration for HST UL TA  **Proposal 2: If 500kph UL TA scenarios are defined, Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). If 500kph is supported and successfully tested, then 350kph does not need to be tested**  High speed support declaration and applicability for 120kph HST UL TA  **Proposal 3: No requirement for UL TA requirement for scenario X.**  **Proposal 4: No declaration for scenario X is needed.**  Additional SCS/BW combinations  **Proposal 5: No additional SCS/BW combinations are required for UL TA requirement.** |
| R4-2006664 | ZTE Wistron Telecom AB | Moderator: CR TS 38.104 |
| R4-2006665 | ZTE Wistron Telecom AB | Organisation of high-speed train requirement sections for UL TA 500kph in specifications  **Proposal 1: Capture requirements for different scenarios in the same table (Option 1).**  High speed support declaration for HST UL TA  **Proposal 3: New declaration item “Maximum supported speed” can override the declaration of 120kph, no separate declaration for 120kph (Option 3).**  Re-use of high speed support declaration for HST UL TA  **Proposal 4: The new declaration item “Maximum supported speed” should cover HST PUSCH, HST PRACH and UL TA (Option 1).**  Additional SCS/CBW combinations and New scenario X  **Proposal 5: Neither introduce new scenario X (option 3), nor any additional SCS/CBW combinations (Option 2).** |
| R4-2006835 | Ericsson | Organisation of high-speed train requirement sections for UL TA 500kph in specifications  **Proposal 1: Agree with Option 1 to capture different scenarios requirements in same table.**  High speed support declaration for HST UL TA  **Proposal 2: Agree with Option 1 to declare by the supported maximum speed, 350kph or 500kph (or no HST support), and 350kph does not need to be tested if 500kph test is passed.**  New scenarios  **Proposal 3: Do not include Scenario X in the scope of HST scenario discussion.**  Additional SCS/CBW combinations  **Proposal 4: Agree with Option 1 to add requirements for 5MHz CBW/15kHz SCS and 10MHz CBW/30kHz SCS for agreed UL TA scenarios.** |
| R4-2007186 | NTT DOCOMO, INC. | Organization of HST requirements for UL TA 500kph in specs  **Proposal 1: RAN4 adopts Option 1 or 2 based on pros and cons consideration.**  Declaration  Thus, we prefer to declare category of supported design target speed for HST UL TA and to share the declaration with PUSCH HST.  **Proposal 1: Allow to declare category of supported design target speed(s) from “no HST”, “HST for 350km/h”, “HST for 500km/h” or “HST for both 350km/h and 500km/h” and introduce the following declaration:**   | Declaration identifier | Declaration | Description | Applicability | | | | --- | --- | --- | --- | --- | --- | | *BS type 1-C* | *BS type 1-H* | *BS type 1-O* | | D.1xx | PUSCH for HST | Declaration of the supported HST scenarios: no HST, HST for 350km/h, HST for 500km/h or HST for both 350km/h and 500km/h. | x | x | x |     Scenario X for UL timing adjustment  **Proposal 3: RAN4 introduces UL timing adjustment requirements under scenario X without any applicability rules (Option 1).**  **Proposal 4: No declaration for Scenario X is needed (Option 3).**  Channel bandwidth  **Proposal 5: RAN4 introduces the PUSCH UL TA performance requirements for 5/10MHz CBW with 15kHz SCS and 10/40MHz CBW with 30kHz SCS (Option 1).** |
| R4-2007232 | Huawei, HiSilicon | Organization of HST requirements for UL TA 500kph in specs  **Proposal 1: Requirements for different scenarios captured in same table for UL TA.**  High speed support declaration  **Proposal 2: Choose Option 1, i.e. For UL TA, declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). If 500kph is supported and successfully tested, then 350kph does not need to be tested.**  Re-use of high speed support declaration for HST UL TA  **Proposal 3: No need to introduce new declared item.**  New scenarios  **Proposal 4: Do not specify scenario “X”.**  Additional SCS/CBW combinations  **Proposal 5: Option 2, i.e. No additional SCS/CBW combinations are required for UL TA requirements.** |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 3-1: UL TA additional scenario “X”

*Sub-topic description:*

In RAN4#94-bis-e several additional UL TA requirements were discussed, but not agreed upon, e.g., new scenarios:

|  |
| --- |
| * New scenarios   + Option 1: Additionally, specify scenario “X”, with the following parameters: 15KHz SCS: A= 10us, Δω =0.04 s-1; 30KHz SCS: A= 5us, Δω =0.08 s-1.   + Option 2: Additionally, specify scenario “X”, with the following parameters: 15KHz SCS: A= 10us, Δω =0.04 s-1; 30KHz SCS: A= 5us, Δω =0.08 s-1. with the applicability rule: BS can declare support for either [no HST/default/no declaration], [350kmp] or [500kmp]. If BS declare supporting of 500km/h，only scenario Z is considered. If BS declare supporting of 350km/h，only scenario Y is considered. If BS declare [no HST/default/no declaration], scenario X is considered.   + Option 3: Do not specify scenario “X”. |

*Open issues and candidate options before e-meeting:*

**Issue 3-1-1: Additional scenario “X”**

* Proposals
  + Option 1 (DoCoMo, CMCC): Specify requirements for scenario X.
  + Option 2 (Huawei, Ericsson, ZTE, Samsung, CATT): Do not specify scenario “X”.
* Recommended WF
  + Collect further company views during 1st round.  
    Please give feedback on how strong the respective request is.
  + Deprioritize the following issues that rely on a decision here.

**Issue 3-1-2: Scenario “X” implicit test passing**

* Conditions
  + **Additional scenario “X” is introduced.**
  + **Support for scenario “X” is not explicitly declared.**
* Proposals
  + Option 1 (Nokia, CMCC, CATT, Ericsson, DoCoMo): No implicit test passing.  
    The requirements for scenario “X” need to be tested, independent of passing requirements for “Y” or “Z”.
  + Option 2 (ZTE): Allow implicit test passing.  
    The requirements for scenario “X” do not need to be tested, only if the requirements for “Y” **or** “Z” have been passed.
  + Option 3 (Huawei): Postpone after 3-1-1.
* Recommended WF
  + Collect further company views during 1st round.

### Sub-topic 3-2: UL TA additional SCS/CBW

*Sub-topic description:*

In RAN4#94-bis-e several additional UL TA requirements were discussed, but not agreed upon, e.g., additional SCS/CBW combinations:

|  |
| --- |
| * Additional SCS/CBW combinations   + Option 1: Add simulation assumptions for 5MHz CBW/15KHz SCS and 10Mhz CBW/30KHz SCS to simulation summary for agreed UL timing adjustment scenarios   + Option 2: No additional SCS/CBW combinations are required for UL TA requirements. |

*Open issues and candidate options before e-meeting:*

**Issue 3-2-1: Additional SCS/CBW combinations**

* Proposals
  + Option 1 (DoCoMo, Ericsson, CATT, CMCC): Add simulation assumptions for 5MHz CBW/15KHz SCS and 10Mhz CBW/30KHz SCS to requirements for agreed UL timing adjustment scenarios
  + Option 2 (Huawei, ZTE, Samsung, Nokia): No additional SCS/CBW combinations are required for UL TA requirements.
  + Option 3 (Nokia): Add simulation assumptions for 5MHz CBW/15KHz SCS and 10Mhz CBW/30KHz SCS to requirements for agreed UL timing adjustment scenarios and use applicability rule to only test supported SCS/CBW combinations.
* Recommended WF
  + Collect further company views during 1st round.  
    Please give feedback on how strong the respective request is.

### Sub-topic 3-3: UL TA applicability rules

*Sub-topic description:*

In RAN4#94-bis-e it was not agreed how to handle the applicability rules 120kph UL TA:

|  |
| --- |
| * High speed support declaration and applicability for 120kph HST UL TA (Pending on decision on Scenario X)   + Option 1: If performance requirement for scenario X is defined, the corresponding performance requirements should be tested when BS declares to support scenario X.   + Option 2: BS can declare support for either [no HST/default/no declaration], [350kmp] or [500kmp]. If BS declare [no HST/default/no declaration], scenario X is considered.   + Option 3: No declaration for scenario X is needed. (Same approach as LTE). |

*Open issues and candidate options before e-meeting:*

**Issue 3-3-1: Applicability for 120kph HST UL TA**

* Proposals
  + Option 1 (DoCoMo): No applicability rule is needed.
  + Option 2 (ZTE): Hold on until the decision on “X” is made.
* Recommended WF
  + Deprioritise until introduction of scenario “X” (issue 3-1-1) is decided.  
    Collect further company views during 1st round.

### Sub-topic 3-4: Manufacturer declaration

*Sub-topic description:*

In RAN4#94-bis-e it was not agreed how to declare high speed support for UL TA:

|  |
| --- |
| * High speed support declaration for HST UL TA   + Option 1: If 500kph UL TA scenarios are defined, Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). If 500kph is supported and successfully tested, then 350kph does not need to be tested.   + Option 2: If 500kph UL TA scenarios are defined, Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). If 500kph is supported, both 350kph and 500kph need to be tested for compliance.   + Option 3: If 500kph UL TA scenarios are defined, Declare category of supported design target speed(s). This can be 350 or 500 or 350&500kph (or no HST support).  Only the corresponding requirements are tested. |

Furthermore, it is also open how to declare support for 120kph UL TA:

|  |
| --- |
| * High speed support declaration and applicability for 120kph HST UL TA (Pending on decision on Scenario X)   + Option 1: If performance requirement for scenario X is defined, the corresponding performance requirements should be tested when BS declares to support scenario X.   + Option 2: BS can declare support for either [no HST/default/no declaration], [350kmp] or [500kmp]. If BS declare [no HST/default/no declaration], scenario X is considered.   + Option 3: No declaration for scenario X is needed. (Same approach as LTE). |

*Open issues and candidate options before e-meeting:*

**Issue 3-4-1: UL TA supported speed declaration for 120kph/Scenario X**

* Proposals
  + Option 1 (Nokia, CMCC, CATT, Ericsson, DoCoMo): No declaration for scenario X is needed; testing scenario X is always required.
  + Option 2 (Samsung): No declaration for scenario X is needed; no requirements for scenario X.
  + Option 3 (ZTE): No declaration for scenario X is needed; testing scenario X is only required, if 350 or 500kph UL TA is not declared to be supported (“overwritten”).
  + Option 4 (Huawei): Postpone to after 3-1-1.
* Recommended WF
  + Proposed agreement:   
    No explicit declaration for scenario X.
  + Proposed WF (deprioritised until introduction of scenario “X” decided):   
    Companies are encouraged to give feedback on Issue 3-1-2: Scenario “X” implicit test passing to answer the second part of the proposals.

**Issue 3-4-2: UL TA supported speed declaration for [120kph], 350kph, and 500kph**

* Proposals
  + Option 1a (CATT, Ericsson, Nokia, CMCC, Samsung): Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support).   
    If 500kph is supported and successfully tested, then 350kph does not need to be tested.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h) for PUSCH and UL timing adjustment for HST. | x | x |

* + Option 1b (ZTE): Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support).   
    If 500kph is supported and successfully tested, then 350kph does not need to be tested.  
    Shared for PUSCH/PRACH/UL TA.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | Maximum supported speed for High Speed Train | Declaration of the maximum supported speed for High Speed Train scenarios. The declaration is chosen from the set {No HST support, 350 km/h, 500 km/h} and applicable to HST PUSCH, UL TA and HST PRACH. Speed(s) less than the declaration shall also be supported under this declaration. | x | x |

* + Option 1c (Ericsson, Samsung, Nokia, CMCC, ZTE): Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support).   
    If 500kph is supported and successfully tested, then 350kph does not need to be tested.
  + Option 1d (CATT): Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support).   
    If 500kph is supported and successfully tested, then 350kph does not need to be tested.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h, or no HST support) for PUSCH and UL timing adjustment for HST. | x | x |

* + Option 1e (Huawei): Declare category of supported maximum speed. This can be either 350km/h or 500km/h. Only the corresponding requirements are tested.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | High speed train | Declaration of high speed train scenario support. | x | x |
| D.109 | Maximum speed of high speed train for PUSCH | Declaration of supported maximum speed for high speed train scenario, i.e. 350 km/h or 500 km/h.  This declaration is applicable to PUSCH for high speed train and UL timing adjustment only if UE declares to support high speed train in D.108. | x | x |
| D.110 | PRACH format for high speed train | Declaration of supported PRACH format(s) for high speed train scenario, i.e. format 0 restricted set type A, format 0 restricted set type B, format A2, format B4, format C2.  This declaration is applicable to HST PRACH only if UE declares to support high speed train in D.108. | x | x |

* + Option 2 (DoCoMo): Declare category of supported design target speed(s) from “no HST”, “HST for 350km/h”, “HST for 500km/h” or “HST for both 350km/h and 500km/h” and introduce the following declaration:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| D.1xx | PUSCH for HST | Declaration of the supported HST scenarios: no HST, HST for 350km/h, HST for 500km/h or HST for both 350km/h and 500km/h. | x | x | x |

* Recommended WF
  + Proposed agreement:  
    Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support). If 500kph is supported and successfully tested, then 350kph does not need to be tested.
  + Proposed WF:   
    Companies are encouraged to give feedback on which declaration wording option they see as best or propose new exact wording options.

**Issue 3-4-3: Re-use of high speed declaration for UL TA**

* Proposals
  + Option 1 (Nokia): No re-use. Independent support declaration for UL TA.
  + Option 2 (Huawei, DoCoMo, CATT, Nokia, Ericsson, CMCC, ZTE, Samsung): Re-use of the PUSCH HST declaration, if they match.
  + Option 3 (ZTE): Re-use of a common HST declaration for PUSCH/UL TA/PRACH.
* Recommended WF
  + Proposed agreement:  
    Re-use of the PUSCH HST declaration for UL TA, if they match.
  + Proposed WF:  
    Come back to this topic once the final wording for PUSCH declaration decided.  
    Take proposed PUSCH/UL TA re-use into account, when decision PUSCH declaration wording.

### Sub-topic 3-5: Specification writing

*Sub-topic description*

With the UL TA requirement organization and simulation contributions having become quite stable, RAN4 can go ahead and finalize the specifications.  
However, it remains to verify the additional need for additions for HST in the measurement set-up and test tolerance definition.

Additionally, the cleaning of the specification TS 38.**104** ahead of ITU submission, will have an impact on the HST UL TA CR treatment in this meeting, as indicated in the following guidance provided by the RAN4 Chair (Steven) and Demod co-chair (Haijie) to the moderators of the relevant email discussions:

[See email in sub-topic 1-6.]

Furthermore, in RAN4#94-bis-e, no conclusion was reached with respect the organization of HST requirements for UL TA 500kph in specs [2]:

|  |
| --- |
| * Organisation of high-speed train requirement sections for UL TA 500kph in specifications.   + Option 1: Requirements for different scenarios captured in same table.   + Option 2: Requirements for different scenarios captured in separate tables. |

*Open issues and candidate options before e-meeting:*

**Issue 3-5-1: Organization of HST requirements for UL TA 500kph in specifications**

* Proposals
  + Option 1 (Huawei, DoCoMo, ZTE, CATT): Requirements for different scenarios captured in same table.
  + Option 2 (DoCoMo, Samsung): Requirements for different scenarios captured in separate tables.
  + Option 3 (Nokia, Ericsson, Samsung[second choice]): Capture the 500kph UL TA scenario in the same table as the 350kph UL TA scenario.
* Recommended WF
  + Collect further company views during 1st round.  
    Explore if compromise to option 1 is possible.

**Issue 3-5-2: Removal of TBD and []**

* Proposals
  + Option 1 (Nokia): Agreeing on SNR values.  
    Unless new simulation results are received, capture the SNR values summarized in R4-2005573 in the UL TA CRs
  + Option 2: (RAN4 chair and demod session chair):   
     Submitted TS 38.104 CRs could be technically endorsed.  
     Submitted TS 38.141-1/2 CRs could be agreed.  
     Try to resolve TBDs and [].
  + Option 3 (Huawei)  
    Firstly check if some companies have plan to submit new results or update their results in next meeting, if no, just agree CRs endorsed in last meeting and add SNR the requirements based on the latest results summary. All other newly submitted CRs for this meeting can only be endorsed if agreeable.
* Recommended WF
  + Do not agree TS 38.104 CRs that introduce new TBDs or [], either postpone, or technically endorse, or change to no longer add new TBDs or [].
    - Discuss, if [] can be removed and TBDs can be replaced in the draftCRs endorsed last meeting.
    - Change all remaining [TBD] to TBD.
    - Consider removing requirements with remaining TBD.

**Issue 3-5-3: HST test setup figures and test tolerances**

* Proposals
  + Option 1 (Nokia): Verify if further HST UL TA additions to “Measurement of performance requirements” (TT definitions in TS 38.131-1/2 appendix C.3) and “Measurement system set-up” for “performance requirements” (appendix D) are required; similar to R4-2003272.
* Recommended WF
  + Test specification CR authors to verify the need for new measurement setup figures and TTs.
    - Remark: LTE has separate measurement setup figure (TS 36.141 I.3.4) and TTs (36.141 G.3) for UL TA.
    - Remark: The initially submitted CR for TS 38.141-2 (R4-2006256) has proposed a new figure for measurement setup for UL TA.
  + Other delegates to check, if the additions in the CR are technically correct and sufficient.

### Sub-topic 3-6: Simulation summary management

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 3-6-1: Additional SCS/CBW combinations in the simulation summary**

* Proposals
  + Option 1 (CATT): Add 500kph UL TA scenario Z to simulation results summary.
* Recommended WF
  + Add 500kph UL TA scenario Z to simulation results summary.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Issue 3-1-1:  Issue 3-1-2:  ….  Others: |
| Ericsson | **Issue 3-1-1: Additional scenario “X”**  Option 2. Since scenario X is not a HST scenario.  **Issue 3-1-2: Scenario “X” implicit test passing**  Option 1.  **Issue 3-4-1: UL TA supported speed declaration for 120kph/Scenario X**  Agree with Option 1, but we think scenario X requirement is a normal scenario and should not be included in HST discussion.  **Issue 3-4-2: UL TA supported speed declaration for [120kph], 350kph, and 500kph**  Agree with Option 1a for now.  **Issue 3-4-3: Re-use of high speed declaration for UL TA**  Can agree with Option 2.  **Issue 3-5-1: Organization of HST requirements for UL TA 500kph in specifications**  Agree with Option 3 since it looks clearer and is aligned with PUSCH.  **Issue 3-5-3: HST test setup figures and test tolerances**  We need further check. But for now, we don’t think new TTs are needed. |
| CMCC | Issue 3-1-1: Considering the channel model of scenario X is different from scenario Y and scenario Z, it is necessary to introduce scenario X.  Issue 3-1-2: option 1. In LTE, requirements are specified for scenario X and no declaration for scenario X. We would like to know the reason why in Rel-15, scenario X is not considered for NR.  Issue 3-2-1: OK with option 1  Issue 3-4-2: it seems that option 1a and option 1c are the same? We are OK with both.  Issue 3-4-3: we are OK with option 2. |
| ZTE | Issue 3-1-1 Additional scenario “X”  Option 2  Issue 3-1-2 “X” implicit test passing  Option 2.  Issue 3-2-1 Additional SCS/CBW combinations  Option 2.  Issue 3-3-1 Applicability for 120kmph HST UL TA  Hold on until the decision on “X” is made.  Issue 3-4-1 UL TA supported speed declaration for 120kmph/Scenario X  Option 3 is simple and future proof.  Issue 3-4-2 UL TA supported speed declaration for [120],350, 500  Option 1c is simple and future proof.  Issue 3-4-3 Re-use of high speed declaration for UL TA  Option 2 and 3 are similar for ULTA, which is our preference.  Issue 3-5-1 Organization of HST requirements for UL TA 500kmph in specs  Option 1.  Issue 3-5-2 Removal of TBD and []  WF recommended by Moderator is reasonable.  Issue 3-5-3 HST test setup figures and test tolerances  WF recommended by Moderator is reasonable. |
| Samsung | **Issue 3-1-1: Additional scenario “X”**  Option 2. Didn’t see the benefit and necessity of introduce additional test case for scenario X.  **Issue 3-1-2: Scenario “X” implicit test passing**  Suggest to defer the discussion and pending on issue 1-3-1.  **Issue 3-2-1: Additional SCS/CBW combinations**  Prefer option 2. No additional test considering work load.  **Issue 3-4-2: UL TA supported speed declaration for [120kph], 350kph, and 500kph**  Support option 1a/1c. we didn’t see the logic if BS declared support 500km/h why such BS cannot support 300km/h. Performance optimization around certain point is BS implementation issues which out of RAN4 scope, RAN4 define minimum performance requirements which assumed no specific optimization. Meanwhile from test aspect, we also didn’t see the necessity to require BS pass both 350km/h and 500km/h test cases, as 500km/h related test cases should be choosed.  **Issue 3-4-3: Re-use of high speed declaration for UL TA**  Can agree with Option 2.  **Issue 3-5-1: Organization of HST requirements for UL TA 500kph in specifications**  Agree with option 2, option 3 also fine for us considering to keep consistent with PUSCH requirements. |
| Nokia, Nokia Shanghai Bell | **Issue 3-1-1: Additional scenario “X”**  No strong opinion from our side, we have a slight preference for option 3, but we can compromise option 1.  **Issue 3-1-2: Scenario “X” implicit test passing**  It is our general understanding that UL TA requirements for 120kph are applicable to all BS, even those that do not support high speed train. As such we don’t think that scenario X is in the same category of BS implementations as HST. And thus, it should need to be tested in all cases. Hence, no implicit test passing (option 1).  **Issue 3-2-1: Additional SCS/CBW combinations**  The UL TA implementation and performance should not differ between SCS/CBW combinations; hence we do not need additional requirements/tests. However, under the condition that there will be an applicability rule to only test supported SCS/CBWs, our opinion on this topic is not very strong.  **Issue 3-3-1: Applicability for 120kph HST UL TA**  We don’t agree with DoCoMo statement that no applicability rule is required. At least for SCS/CBW combinations an applicability rule is required. However, we agree with the our suspected intention of DoCoMo that no applicability rule is required w.r.t. being able to chose a single scenario to be tested, when more than one is declared to be supported.  **Issue 3-4-1: UL TA supported speed declaration for 120kph/Scenario X**  It is our general understanding that UL TA requirements for 120kph are applicable to all BS, even those that do not support high speed train. Hence no matter the declaration (including absent UL TA speed declaration), scenario X will need to be tested and, in particular, we don’t need a separate declaration for scenario X support.  **Issue 3-4-2: UL TA supported speed declaration for [120kph], 350kph, and 500kph**  Unlike for PUSCH, we don’t think that differing implementations can exist for UL TA command handling, that distinguish 500 from 350&500 kph deployed BS. Hence we agree with both option 1a and 1c.  **Issue 3-4-3: Re-use of high speed declaration for UL TA**  No strong opinion on this topic. Both option 1 and 2 are fine for us, assuming that PUSCH and UL TA declarations categories match formally.  **Issue 3-5-1: Organization of HST requirements for UL TA 500kph in specifications**  Option 1 and 3 are the same, assuming no scenario X introduced, or scenario X is taken to be a high speed requirement. To protect against the latter case, we proposed the wording of the agreement in option 3.  **Issue 3-5-2: Removal of TBD and []**  Each CR should be considered separately in the corresponding section of this document. But the recommended WF seems like a good starting point for this evaluation.  **Issue 3-5-3: HST test setup figures and test tolerances**  Each CR should be considered separately in the corresponding section of this document. But the recommended WF seems like a good starting point for this evaluation. |
| Huawei | **Issue 3-1-1: Additional scenario “X”**  We prefer Option 2. Do not specify scenario “X”. Fading channel with large Doppler is not the typical application scenario. We don’t see any necessary to introduce such scenario.  **Issue 3-1-2: Scenario “X” implicit test passing**  Discuss this issue after the agreement for Issue 3-1-1 is achieved.  **Issue 3-2-1: Additional SCS/CBW combinations**  We prefer Option 2. No additional SCS/CBW combinations are required for UL TA requirements. We do not think there is NR BS that only supports the smallest CBW of 5MHz/15kHz and 10MHz/30kHz SCS, and do not support the typical bandwidth of 10MHz/15kHz and 40MHz/30kHz.  **Issue 3-3-1: Applicability for 120kph HST UL TA**  Discuss this issue after the agreement for Issue 3-1-1 is achieved.  **Issue 3-4-1: UL TA supported speed declaration for 120kph/Scenario X**  Discuss this issue after the agreement for Issue 3-1-1 is achieved.  **Issue 3-4-2: UL TA supported speed declaration for [120kph], 350kph, and 500kph**  Same as Issue 1-5-1, we provide our declaration for HST.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | High speed train | Declaration of high speed train scenario support. | x | x | | D.109 | Maximum speed of high speed train for PUSCH | Declaration of supported maximum speed for high speed train scenario, i.e. 350 km/h or 500 km/h.  This declaration is applicable to PUSCH for high speed train and UL timing adjustment only if UE declares to support high speed train in D.108. | x | x | | D.110 | PRACH format for high speed train | Declaration of supported PRACH format(s) for high speed train scenario, i.e. format 0 restricted set type A, format 0 restricted set type B, format A2, format B4, format C2.  This declaration is applicable to HST PRACH only if UE declares to support high speed train in D.108. | x | x |   **Issue 3-4-3: Re-use of high speed declaration for UL TA**  We prefer Option 2. Re-use of the PUSCH HST declaration, if they match.  **Issue 3-5-1: Organization of HST requirements for UL TA 500kph in specifications**  We prefer Option 1 to make the specification more clear.  **Issue 3-5-2: Removal of TBD and []**  Same as Issue 1-6-1. Firstly check if some companies have plan to submit new results or update their results in next meeting, if no, just agree CRs endorsed in last meeting and add SNR the requirements based on the latest results summary. All other newly submitted CRs for this meeting can only be endorsed if agreeable.  **Issue 3-6-1: Additional SCS/CBW combinations in the simulation summary**  We agree with the recommended WF. |
| CATT | **Issue 3-1-1: Additional scenario “X”**  Prefer option 2. Scenario X (120km/h) cannot be included in HST scenarios. Additionally, the multi-path fading channel is not typical in HST scenarios. From the fading channel perspective, there is also no need to specify scenario X with the fading channel.  **Issue 3-1-2: Scenario “X” implicit test passing**  120km/h (scenario X) cannot be included in HST scenarios. If performance requirement for scenario X is defined, the LTE principle can be reused to not declare scenario X. Scenario X will be tested separately even the higher speed has passed the test.  **Issue 3-2-1: Additional SCS/CBW combinations**  Prefer option 1 to keep consistent with PUSCH for PUSCH UL TA. The agreement reached for PSUCH is to add requirements for 5MHz CBW/15kHz SCS, 10MHz CBW/30kHz SCS for CP-OFDM. This can be shared for UL TA.  **Issue 3-4-1: UL TA supported speed declaration for 120kph/Scenario X**  Same comments as Issue 3-1-2.  **Issue 3-4-2: UL TA supported speed declaration for [120kph], 350kph, and 500kph**  Prefer option 1. The wording should be aligned as much as possible.  **Issue 3-4-3: Re-use of high speed declaration for UL TA**  Prefer option 2. It is a natural way to share the support declaration between PUSCH and UL TA.  **Issue 3-5-1: Organization of HST requirements for UL TA 500kph in specifications**  Prefer option 1. No need to use separate tables like LTE HST.  **Issue 3-5-2: Removal of TBD and []**  OK with the recommended WF. |
| NTT DOCOMO | Issue 3-1-1: We prefer Option 1. As mentioned in PUSCH HST, multipath fading condition also should be assumed in both normal cells and HST cells.  Issue 3-1-2: We prefer Option 1.  Issue 3-2-1: The SCS/BW combination shall be aligned with PUSCH HST. If option 2 is adopted, some BS that support only lower CBW than 10MHz/15kHz or 40MHz/30kHz cannot be tested. We should avoid such a limitation.  Issue 3-4-1: We prefer Option 1.  Issue 3-4-3: We agree with recommended WF. |
|  |  |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| R4-2006255 (CATT) | Ericsson:   * Cover sheet: Other specs impacted field should be filled in * Test procedure: We think the procedure is different for HST and we might need to deliver CR for this part according to our understand. * RB assignment and Starting PRB index: Adding SCS would make it clearer. |
| Company B |
|  |
| R4-2006256 (CATT) | Company A |
| Company B |
|  |
| R4-2006321 (Samsung) | Ericsson:   * Cover sheet: CR number is missing * Test procedure: We think the procedure is different for HST and we might need to deliver CR for this part according to our understand. |
| Company B |
|  |
| R4-2006322 (Samsung) | Ericsson: CR number is missing, and the TT value should be 0.6dB. |
| Company B |
|  |
| R4-2006664 (ZTE) | [Moderator]: - Please observe the outcome of the chair guidance captured and discussed in sub-topic 3-5. |
| Ericsson:   * Cover sheet: “RAN4” should be “R4” * Should not be highlighting for the changes. |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |
| **Sub-topic#3-1** | **Sub-topic#3-1: UL TA additional scenario “X”**  *Tentative agreements:*  None.  *Candidate options:*  **Issue 3-1-1: Additional scenario “X”**   * Option 1: Specify requirements for scenario X. * Option 2: Do not specify scenario “X”.   **Issue 3-1-2: Scenario “X” implicit test passing**   * Conditions   + Assuming additional scenario “X” is introduced.   + Assuming support for scenario “X” is not explicitly declared. * Option 1: No implicit test passing. The requirements for scenario “X” need to be tested, independent of passing requirements for “Y” or “Z”. * Option 2: Allow implicit test passing. The requirements for scenario “X” do not need to be tested, only if the requirements for “Y” **or** “Z” have been passed. * Option 3: Postpone after 3-1-1.   *Recommendations for 2nd round:*  **Issue 3-1-1: Additional scenario “X”**   * Continue the discussion in 2nd round.   **Issue 3-1-2: Scenario “X” implicit test passing**   * Continue the discussion in 2nd round. * Option 1 seems like a possible way forward. |
| **Sub-topic#3-2** | **Sub-topic#3-2: UL TA additional SCS/CBW**  *Tentative agreements:*  None  *Candidate options:*  **Issue 3-2-1: Additional SCS/CBW combinations**   * Option 1: Add simulation assumptions for 5MHz CBW/15KHz SCS and 10Mhz CBW/30KHz SCS to requirements for agreed UL timing adjustment scenarios * Option 2: No additional SCS/CBW combinations are required for UL TA requirements. * Option 3: Add simulation assumptions for 5MHz CBW/15KHz SCS and 10Mhz CBW/30KHz SCS to requirements for agreed UL timing adjustment scenarios and use applicability rule to only test supported SCS/CBW combinations.   *Recommendations for 2nd round:*  **Issue 3-2-1: Additional SCS/CBW combinations**   * Continue the discussion in 2nd round. * Option 3 seems like a possible WF. |
| **Sub-topic#3-3** | **Sub-topic#3-3: UL TA applicability rules**  *Tentative agreements:*  None.  *Candidate options:*  **Issue 3-3-1: Applicability for 120kph HST UL TA**   * Option 1: No applicability rule is needed. * Option 2: Hold on until the decision on “X” is made.   *Recommendations for 2nd round:*  **Issue 3-3-1: Applicability for 120kph HST UL TA**   * Postpone until decision about issue 3-1-1 is made. |
| **Sub-topic#3-4** | **Sub-topic#3-4: Manufacturer declaration**  *Tentative agreements:*  **Issue 3-4-3: Re-use of high speed declaration for UL TA**   * Re-use of the PUSCH HST declaration, if they match.   *Candidate options:*  **Issue 3-4-1: UL TA supported speed declaration for 120kph/Scenario X**   * Option 1: No declaration for scenario X is needed No declaration for scenario X is needed; testing scenario X is always required. * Option 2: No declaration for scenario X is needed; no requirements for scenario X. * Option 3: No declaration for scenario X is needed; testing scenario X is only required, if 350 or 500kph UL TA is not declared to be supported (“overwritten”). * Option 4: Postpone to after 3-1-1.   **Issue 3-4-2: UL TA supported speed declaration for [120kph], 350kph, and 500kph**   * Option 1a: Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support).  If 500kph is supported and successfully tested, then 350kph does not need to be tested.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h) for PUSCH and UL timing adjustment for HST. | x | x |  * Option 1b: Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support).  If 500kph is supported and successfully tested, then 350kph does not need to be tested. Shared for PUSCH/PRACH/UL TA.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | Maximum supported speed for High Speed Train | Declaration of the maximum supported speed for High Speed Train scenarios. The declaration is chosen from the set {No HST support, 350 km/h, 500 km/h} and applicable to HST PUSCH, UL TA and HST PRACH. Speed(s) less than the declaration shall also be supported under this declaration. | x | x |  * Option 1d (CATT): Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support).  If 500kph is supported and successfully tested, then 350kph does not need to be tested.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h, or no HST support) for PUSCH and UL timing adjustment for HST. | x | x |  * Option 1e (Huawei): Declare category of supported maximum speed. This can be either 350km/h or 500km/h. Only the corresponding requirements are tested.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | D.108 | High speed train | Declaration of high speed train scenario support. | x | x | | D.109 | Maximum speed of high speed train for PUSCH | Declaration of supported maximum speed for high speed train scenario, i.e. 350 km/h or 500 km/h.  This declaration is applicable to PUSCH for high speed train and UL timing adjustment only if UE declares to support high speed train in D.108. | x | x |   *Recommendations for 2nd round:*  **Issue 3-4-1: UL TA supported speed declaration for 120kph/Scenario X**   * Continue discussing remaining candidate options in 2nd round.   **Issue 3-4-2: UL TA supported speed declaration for [120kph], 350kph, and 500kph**   * Continue discussion in 2nd round. * This declaration is encouraged to be aligned with any style chosen in PUSCH. * Prioritize PUSCH discussion, due to “UL TA should match PUSCH” tentative agreement.   **Issue 3-4-3: Re-use of high speed declaration for UL TA**   * Tentative agreement is agreeable. |
| **Sub-topic#3-5** | **Sub-topic#3-5: Specification writing**  *Tentative agreements:*  **Issue 3-5-2: Removal of TBD and []**  Each CR should be considered separately in the corresponding section of this document, this evaluation starts from the following goals:   * + Do not agree TS 38.104 CRs that introduce new TBDs or [], either postpone, or technically endorse, or change to no longer add new TBDs or [].     - Discuss, if [] can be removed and TBDs can be replaced in the draftCRs endorsed last meeting.     - Change all remaining [TBD] to TBD.     - Consider removing requirements with remaining TBD.   **Issue 3-5-3: HST test setup figures and test tolerances**   * Test specification CR authors to verify the need for new measurement setup figures and TTs.   + Remark: LTE has re-used the measurement setup figure for PUSCH in PUSCH HST (TS 36.141 I.3.2) by adding “HST” to heading and caption, as well as adding a note. LTE also added new PUSCH HST TTs (36.141 G.3). * Other delegates to check, if the additions in the CR are technically correct and sufficient.   *Candidate options:*  **Issue 3-5-1: Organization of HST requirements for UL TA 500kph in specifications**   * Option 1: Requirements for different scenarios captured in same table. * Option 2: Requirements for different scenarios captured in separate tables. * Option 3: Capture the 500kph UL TA scenario in the same table as the 350kph UL TA scenario.   **Issue 3-5-2: Removal of TBD and []**   * Option 3: Firstly check if some companies have plan to submit new results or update their results in next meeting, if no, just agree CRs endorsed in last meeting and add SNR the requirements based on the latest results summary. All other newly submitted CRs for this meeting can only be endorsed if agreeable.   *Recommendations for 2nd round:*  **Issue 3-5-1: Organization of HST requirements for UL TA 500kph in specifications**   * Continue to discuss in 2nd round.   **Issue 3-5-2: Removal of TBD and []**   * The tentative agreements and candidate options can directly be implemented in the evaluation of the CRs submitted to this meeting and don’t need to be officially agreed in the chairman minutes/WFs. Though they might be captured for informative purposes in the WF.   **Issue 3-5-3: HST test setup figures and test tolerances**   * Same as issue 3-5-2. |
| **Sub-topic#3-6** | **Sub-topic#3-6: Simulation summary management**  *Tentative agreements:*  **Issue 3-6-1: Additional SCS/CBW combinations in the simulation summary**   * Add 500kph UL TA scenario Z to simulation results summary.   *Candidate options:*  None.  *Recommendations for 2nd round:*  **Issue 3-6-1: Additional SCS/CBW combinations in the simulation summary**   * The tentative agreement was already implemented in the simulation summary submitted to this meeting and doesn’t need to be officially captured in the chairman minutes/WFs. |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 | none | none |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |
| R4-2006255 | To be revised. |
| R4-2006256 | To be revised. |
| R4-2006321 | To be revised. |
| R4-2006322 | To be revised. |
| R4-2006664 | To be revised.  Does not remove [] in 38.104. |

## Discussion on 2nd round (if applicable)

~~Remark: Will be filled in for the revised version on Monday to guide and capture discussions in second round.~~

Please continue the discussion

### Sub-topic 3-1: UL TA additional scenario “X”

**Issue 3-1-1: Additional scenario “X”**

* Option 1 (CMCC, Nokia, ZTE, DCM): Specify requirements for scenario X.
* Option 2 (Nokia, ZTE, Huawei): Do not specify scenario “X”.

*Recommendations for 2nd round:*

* Continue the discussion in 2nd round.

Company Comments:  
(Dialog; please do not modify earlier comments, add follow-up always at the bottom of the discussion.)

[Moderator]: It is still encouraged to mention the how strong the respective decision is.

[Company 1]:

[Company 2]:

CMCC: option 1. Considering the channel model of scenario X is different from scenario Y and scenario Z, it is better to introduce scenario X.

[Nokia]: Both are fine for us.

[ZTE]: Both option are ok.

Huawei: We still prefer Option 2. Do not specify scenario “X”. Fading channel with large Doppler is not the typical application scenario. We don’t see any necessary to introduce such scenario.

[DCM]: We prefer Option 1. The performance degradation due to multi-path fading condition cannot confirmed by Scenario Y or Z.

**Issue 3-1-2: Scenario “X” implicit test passing**

* Conditions
  + Assuming additional scenario “X” is introduced.
  + Assuming support for scenario “X” is not explicitly declared.
* Option 1 (Ericsson, CMCC, Nokia, DCM): No implicit test passing.  
  The requirements for scenario “X” need to be tested, independent of passing requirements for “Y” or “Z”.
* Option 2: Allow implicit test passing.  
  The requirements for scenario “X” do not need to be tested, only if the requirements for “Y” **or** “Z” have been passed.
* Option 3 (Huawei): Postpone after 3-1-1.

*Recommendations for 2nd round:*

* Option 1 seems like a possible way forward.

Company Comments:

[Moderator]: A large majority was observed in favour of option 1 in the first round.  
The moderator would like to propose to agree on option 1 (including all the limitations mentioned), unless opponents explicitly uphold their objection in round 2.

[Company 1]:

[Company 2]:

Ericsson: We can accept Option 1.

CMCC: option 1

[Nokia]: It is our general understanding that UL TA requirements for 120kph are applicable to all BS, even those that do not support high speed train. As such we don’t think that scenario X is in the same category of BS implementations as HST. And thus, it should need to be tested in all cases.  
Hence, no implicit test passing (option 1).

[Huawei]: We prefer Option 3

DCM: We prefer Option 1.

### Sub-topic 3-2: UL TA additional SCS/CBW

**Issue 3-2-1: Additional SCS/CBW combinations**

* Option 1: Add simulation assumptions for 5MHz CBW/15KHz SCS and 10Mhz CBW/30KHz SCS to requirements for agreed UL timing adjustment scenarios
* Option 2 (Nokia): No additional SCS/CBW combinations are required for UL TA requirements.
* Option 3 (Ericsson, Nokia, ZTE, Huawei, DCM): Add simulation assumptions for 5MHz CBW/15KHz SCS and 10Mhz CBW/30KHz SCS to requirements for agreed UL timing adjustment scenarios and use applicability rule to only test supported SCS/CBW combinations.

*Recommendations for 2nd round:*

* Option 3 seems like a possible WF.

Company Comments:

[Moderator]: At the very end of round 1, option 3 was proposed as a compromise. Companies are encouraged to verify its acceptability.

[Company 1]:

[Company 2]:

Ericsson: have no strong opinion, but Option 3 can be accepted.

[Nokia]: The UL TA implementation and performance should not differ between SCS/CBW combinations; hence we do not need additional requirements/tests.  
However, under the condition that there will be an applicability rule to only test supported SCS/CBWs, our opinion on this topic is not very strong.  
Hence we can accept both option 2 and 3.

[ZTE]: Option 3 preferred.

[Huawei]: We can compromise to Option 3.

[DCM]: We are fine with Option 3.

### Sub-topic 3-3: UL TA applicability rules

**Issue 3-3-1: Applicability for 120kph HST UL TA**

* Option 1: No applicability rule is needed.
* Option 2: Hold on until the decision on “X” is made.

*Recommendations for 2nd round:*

* Postpone until decision about issue 3-1-1 is made.

Company Comments:

[Company 1]:

[Company 2]:

### Sub-topic 3-4: Manufacturer declaration

**Issue 3-4-1: UL TA supported speed declaration for 120kph/Scenario X**

* Option 1 (CMCC, Nokia, ZTE, DCM): No declaration for scenario X is needed; testing scenario X is always required.
* Option 2: No declaration for scenario X is needed; no requirements for scenario X.
* Option 3(ZTE): No declaration for scenario X is needed; testing scenario X is only required, if 350 or 500kph UL TA is not declared to be supported (“overwritten”).
* Option 4 (Huawei): Postpone to after 3-1-1.
* Option 5 (Nokia, ZTE, DCM): No declaration for scenario X is needed.

*Recommendations for 2nd round:*

* Continue discussing remaining candidate options in 2nd round.

Company Comments:

[Moderator]: Consensus on “no declaration for scenario X is needed” was almost reached in 1st round, but then the agreement was requested to be postponed to after 3-1-1. In case no progress is achieved for 3-1-1 in the beginning of the 2nd round, the moderator will make this tentative agreement once again.

[Company 1]:

[Company 2]:

CMCC: option 1

[Nokia]: In line with our previous comments, we think option 1 is the only correct choice.  
We would propose to simply agree that “No declaration for scenario X is needed” is agreed in the WF.

[ZTE] Option 1, 3 and 5 are ok.

[DCM]: Option 1 and 5 are fine.

**Issue 3-4-2: UL TA supported speed declaration for [120kph], 350kph, and 500kph**

* Option 1a (ZTE): Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support).   
  If 500kph is supported and successfully tested, then 350kph does not need to be tested.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h) for PUSCH and UL timing adjustment for HST. | x | x |

* Option 1b: Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support).   
  If 500kph is supported and successfully tested, then 350kph does not need to be tested.  
  Shared for PUSCH/PRACH/UL TA.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | Maximum supported speed for High Speed Train | Declaration of the maximum supported speed for High Speed Train scenarios. The declaration is chosen from the set {No HST support, 350 km/h, 500 km/h} and applicable to HST PUSCH, UL TA and HST PRACH. Speed(s) less than the declaration shall also be supported under this declaration. | x | x |

* Option 1d (CATT): Declare category of supported maximum speed. This can be either 350 or 500kph (or no HST support).   
  If 500kph is supported and successfully tested, then 350kph does not need to be tested.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | Supported maximum speed | Declaration of supported maximum speed (i.e. 350km/h, 500km/h, or no HST support) for PUSCH and UL timing adjustment for HST. | x | x |

* Option 1e (Huawei): Declare category of supported maximum speed. This can be either 350km/h or 500km/h. Only the corresponding requirements are tested.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.108 | High speed train | Declaration of high speed train scenario support. | x | x |
| D.109 | Maximum speed of high speed train for PUSCH | Declaration of supported maximum speed for high speed train scenario, i.e. 350 km/h or 500 km/h.  This declaration is applicable to PUSCH for high speed train and UL timing adjustment only if BS declares to support high speed train in D.108. | x | x |

*Recommendations for 2nd round:*

* This declaration is encouraged to be aligned with any style chosen in PUSCH.
* Prioritize PUSCH discussion, due to “UL TA should match PUSCH” tentative agreement.

Company Comments:

[Moderator]: Prioritize the PUSCH declaration discussion and leave this UL TA declaration deprioritized due to “re-use of the PUSCH HST declaration if they match” agreement in the first round.

[Company 1]:

[Company 2]:

[Nokia]: Align with the style chosen in PUSCH.

Huawei: We prefer Option 1e and align with PUSCH.

### Sub-topic 3-5: Specification writing

**Issue 3-5-1: Organization of HST requirements for UL TA 500kph in specifications**

* Option 1 (Huawei): Requirements for different scenarios captured in same table.
* Option 2: Requirements for different scenarios captured in separate tables.
* Option 3 (Nokia): Capture the 500kph UL TA scenario in the same table as the 350kph UL TA scenario.

*Recommendations for 2nd round:*

* Continue to discuss in 2nd round.

Company Comments:

[Company 1]:

[Company 2]:

[Nokia]: Option 3 equal to option 1, since we constrained this issue to 500kph in the title.  
However, the intention is clearer that the decision here does not impact 120kph scenarios later.

Huawei: Option 1 to make the specification more clear.

**Issue 3-5-2: Removal of TBD and []**

* Option 3:  
  Firstly check if some companies have plan to submit new results or update their results in next meeting, if no, just agree CRs endorsed in last meeting and add SNR the requirements based on the latest results summary. All other newly submitted CRs for this meeting can only be endorsed if agreeable.

*Recommendations for 2nd round:*

* The tentative agreements and candidate options can directly be implemented in the evaluation of the CRs submitted to this meeting and don’t need to be officially agreed in the chairman minutes/WFs. Though they might be captured for informative purposes in the WF.

Company Comments:

[Moderator]: Unless a request to the contrary is voiced here, companies with draft CRs are encouraged to capture the results from R4-2008822 (revision of “R4-2006254\_Summary of ideal and impairment results for NR HST demodulation requirements\_Samsung\_Huawei\_Intel.xlsm”) in their respective CRs.

[Company 1]:

[Company 2]:

### Sub-topic 3-6: Simulation summary management

Finished in 1st round.

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2006255 (CATT)  >  R4-2008832 | Ericsson:   * Cover sheet: Other specs impacted field should be filled in * Test procedure: We think the procedure is different for HST and we might need to deliver CR for this part according to our understand. * RB assignment and Starting PRB index: Adding SCS would make it clearer. |
| Company B |
|  |
| R4-2006256 (CATT)  >  R4-2008833 | Company A |
| Company B |
|  |
| R4-2006321 (Samsung)  >  R4-2008834 | Ericsson:   * Cover sheet: CR number is missing * Test procedure: We think the procedure is different for HST and we might need to deliver CR for this part according to our understand. |
| Company B |
|  |
| R4-2006322 (Samsung)  >  R4-2008835 | Ericsson: CR number is missing, and the TT value should be 0.6dB. |
| Company B |
|  |
| R4-2006664 (ZTE)  >  R4-2008836 | [Moderator]: - Please observe the outcome of the chair guidance captured and discussed in sub-topic 3-5. |
| Ericsson:   * Cover sheet: “RAN4” should be “R4” * Should not be highlighting for the changes. |
|  |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |